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IN THIS ISSUE

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THE JOURNAL OF THE ARMY ORDNANCE ASSOCIATION WASHINGTON, D. C.

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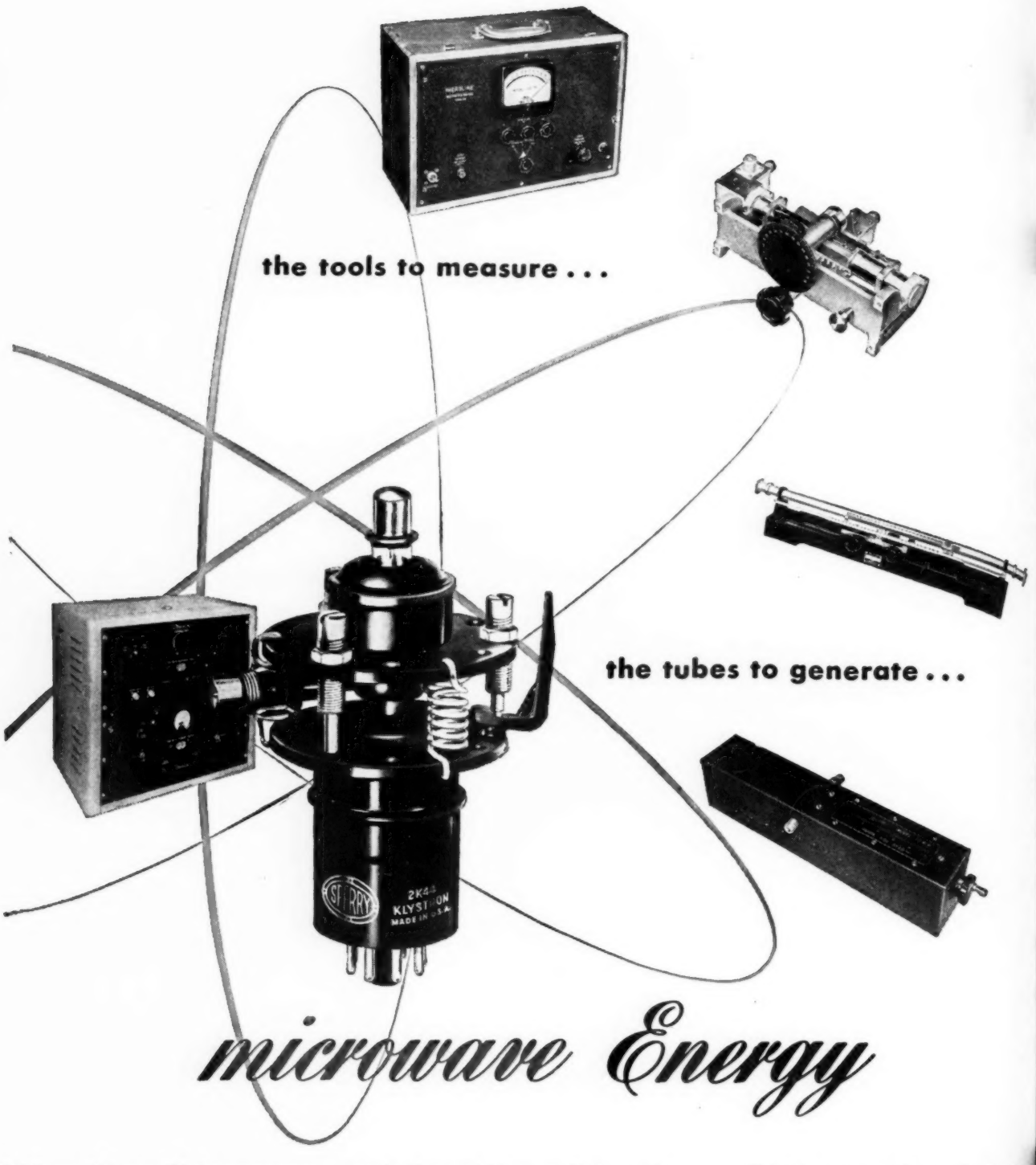

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This issue of ORDNANCE is devoted to the proceedings of Twenty-ninth Annual Meeting of the Army Ordnance Association. With sessions at the Waldorf-Astoria, in New York City and at the Aberdeen Proving Ground, Md., the historic occasion was dedicated to "National Security Now."

The Industrial Preparedness Session was held at the Waldorf on October 1, 1947. It opened with an Ordnance Clinic in the Wedgwood Room at 10 A.M. and featured reports from the chairmen of the various national Activities Divisions of the Association in addition to other speakers. (See pages 227-232.)

The Industrial Preparedness Luncheon took place at 12:30 (see pages 237-240) and was followed by the Ordnance Round Table at which outstanding guest speakers and the presidents of A.O.A. Posts were heard (pp. 242-252).

The Twenty-ninth Annual Dinner Meeting in the evening was attended by 1,250 members and guests including some of the most outstanding names in government, industry, and the defense services. Secretary of Defense James Forrestal was the principal speaker. (See pages 253-261.) During the dinner, A.O.A. medals were awarded for outstanding service to the national defense (pp. 262-263).

The second session, held at Aberdeen on October 2nd, was devoted to a study of the development of Ordnance automotive equipment and an exhibition of modern weapons in action under battlefield conditions (pp. 264-265).

The enthusiasm and interest in the problems of the Industry-Ordnance team shown at this meeting augur well for the future security of America—on the ground, at sea, and in the air.

—*The Editors*

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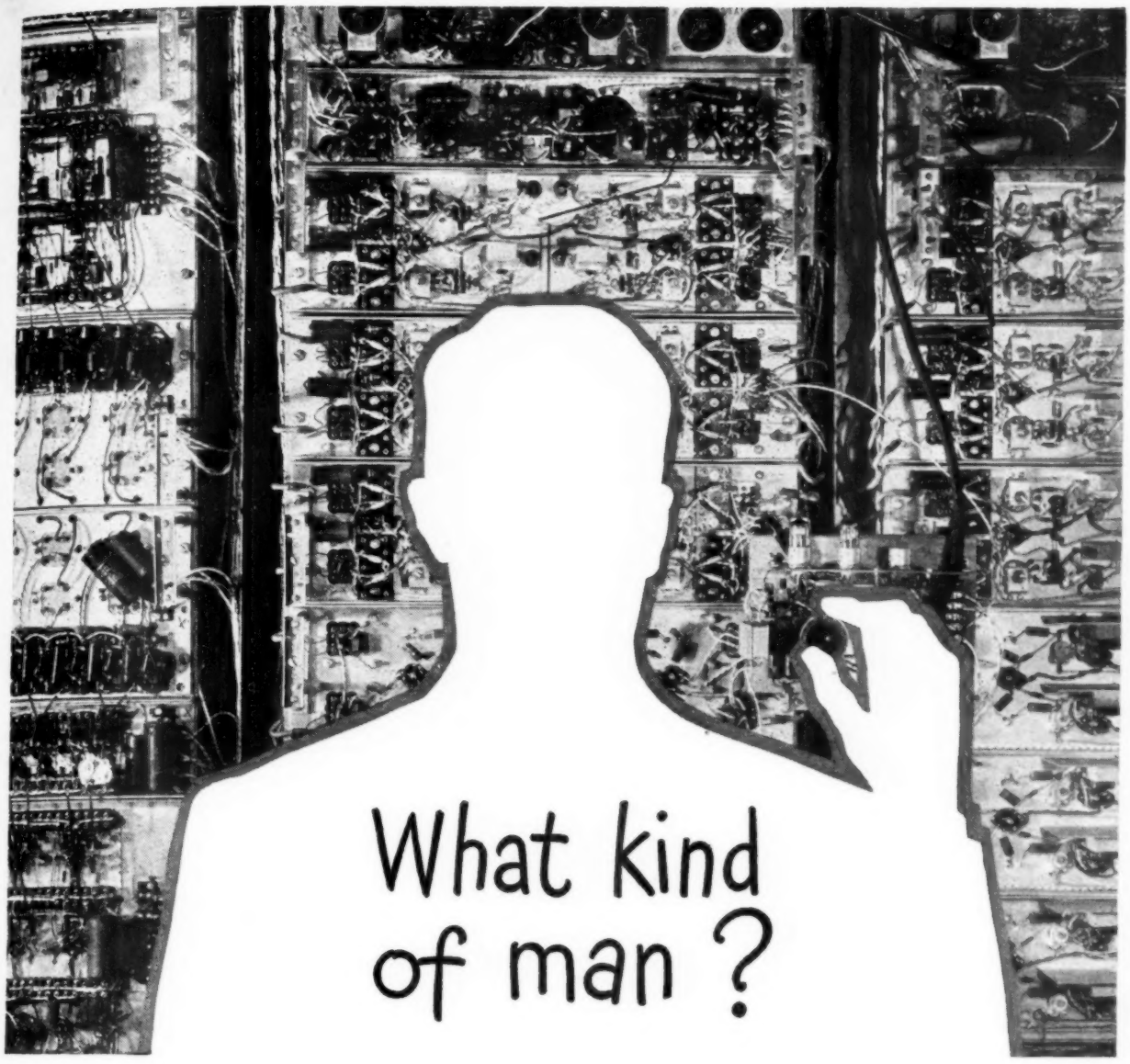

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New Developments

GROUND

NEW WEAPONS RESEARCH

The Government is spending hundreds of millions in preparation for possible war in the upper atmosphere, war involving supersonic speed, and war in Arctic cold, President Truman's scientific research board reported recently. Discussed in the report are studies for development of guided missiles, jet and rocket aircraft, atomic weapons, agents of poison and bacteriological warfare, and a host of electronic devices.

Among the more significant electronic developments is a "revolutionary radar fire-control system" which may one day be perfected into a defense against rocket-borne weapons of atomic or poison warfare.

AUTOMATIC WEATHER STATIONS

The Signal Corps has developed an automatic weather station designed to replace manned stations where it is impossible to maintain observers. The equipment contains elements for measuring atmospheric pressure, temperature, relative humidity, wind direction, and rainfall.

SOUND KILLS

Sound, too high-pitched for the human ear to hear, given out from a lantern-shaped siren developed at the Pennsylvania State College, contains enough heat energy to light a pipe, pop corn, or to kill a mouse in sixty seconds.

EXPLOSIVES TO ORDNANCE

The Ordnance Department has been given sole responsibility for research and development, specifications, coördination of requirements and provision of funds, procurement, inspection, storage and issue of explosives, explosive devices for mine-field clearance and demolition purposes, fuzes, firing devices, and related auxiliary equipment. This responsibility was transferred to Ordnance from the Corps of Engineers.

NEW AIR-BORNE TACTICS

Gen. Jacob L. Devers, commanding general of the Army Ground Forces, predicted that in future wars infantry troops will drop from the skies with full combat equipment in detachable airplane compartments. Each parachute unit would contain several men. Paratroops using individual parachutes, he said, are on the way out.

These developments may take the form of droppable or detachable compartments. Eventually, the entire plane will parachute to a landing, utilizing some refinement of the German-invented ribbon parachute which is already undergoing tests for landing cargo, he said.

With air-borne infantry divisions, and with standard infantry divisions completely air-transportable, airheads within striking distance of an enemy's factories, stockpiles, launching sites, and airfields could be established more quickly and easily than beachheads far remote from the sources of his attacks.

BOMBS BURIED

Shortage of magazine storage space for the large quantity of ammunition now on hand has led to the development by the Ordnance Department of a process of burying bombs in the earth to

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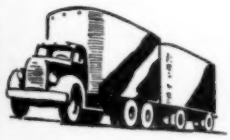
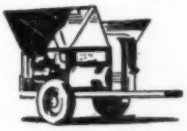


TRACTORS

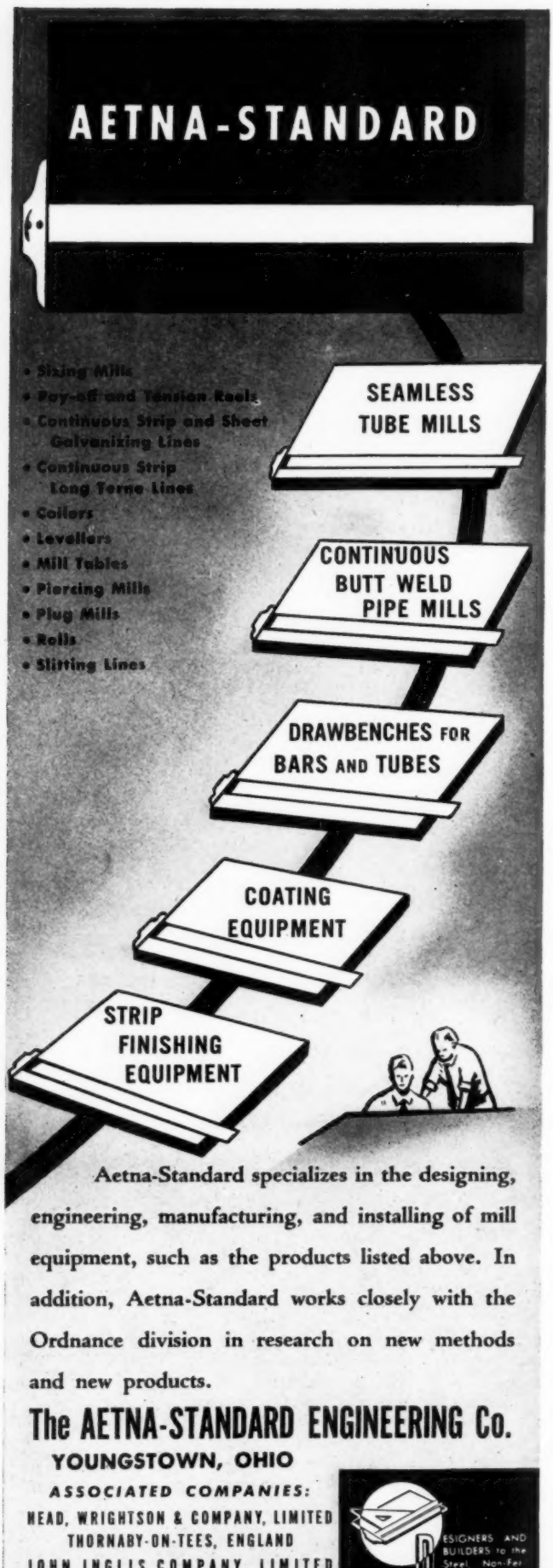
COMPRESSORS



WELDERS

INDUSTRIAL TRUCKS

EARTH MOVERS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preserve them. Called "Operation Buried Alive," this new project, which is still in the experimental stage but gives every promise of being completely successful, can result in substantial savings.

First, it can eliminate need for new magazine construction; secondly, it will cut surveillance to a minimum; and, thirdly, it will make no longer necessary periodic inspections with possible renovation and repeated coating with preservative materials.

PEDERSEN CLAIM DISMISSED

John D. Pedersen, gun designer, recently sued the Government for royalties and compensation in connection with alleged breach of patent license in the use of his inventions in semiautomatic rifles. The suit was in connection with manufacture and use of the M1 or Garand semiautomatic rifles used by the United States in World War II. The Court of Claims, in dismissing the suit on October 6, 1947, said:

"We conclude that the Pedersen rifle was not adopted by the Army; that the M1 or Garand rifle, which was adopted, was not the Pedersen rifle in appearance, structure, operation, or in any validly patented detail. It follows that the plaintiff is not entitled to recover either royalties under his contract or compensation for the use of his patented inventions."

R.O.T.C. INTELLIGENCE TRAINING

R.O.T.C. students who volunteer for such study will be trained at five universities in the Fifth Army Area in the purposes and methods of military intelligence. The schools are: University of Missouri, Columbia, Mo.; University of Illinois, Champaign, Ill.; Michigan State Agriculture and Applied Sciences College, Lansing, Mich.; University of Nebraska, Lincoln, Nebr.; and the University of Wyoming, Laramie, Wyo. The training will include lectures in the various types of intelligence and operations, intelligence functional organization and agencies, demonstrations by intelligence specialist teams, local contacts with the FBI and other investigative agencies, classroom problems, and field maneuvers.

COLDEST COLD

Production of the coldest cold ever attained—less than one degree above absolute zero or about 458 degrees below zero on the ordinary Fahrenheit thermometer—will enable scientists to uncover new facts about the behavior of supercooled metals and to find ways to make use of such frigid temperatures.

Dr. Aaron Wexler is conducting such low-temperature experiments at the research laboratories of Westinghouse Electric Corporation.

Dr. Wexler produces his supercold temperatures by changing gaseous helium to the liquid form, causing a drop of some 520 degrees Fahrenheit. The helium gas, in ultrapure form, is raised to a high pressure by passing it through a 4-stage compressor system. This gas under high pressure then is put to work driving two piston engines and in so doing gives up a large amount of its energy in the form of heat—thus cooling the gas.

To get to the temperature of liquid helium—four degrees above absolute zero—a small portion of the high-pressure gas, precooled by gas from the engines, is expanded through a tiny opening. Temperatures a fraction above absolute zero can be obtained by pumping a vacuum above this liquid helium.

NEW POWDER

A patent on a new method for making rifle powder has been granted to a New Jersey man. The new propellant uses violent explosives like TNT and PETN, formerly employed only as bursting charges in high-explosive projectiles, for boosting bullet speeds.

The trick lies in finely pulverizing the high explosive and

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Elmes presses are flexible, fast, easy to use

Modern Elmes hydraulic presses bring you the benefits of nearly a century of *constant research* ...close cooperation with industry in developing *new methods* and machinery . . . long-time success in applying power-presses for *all* purposes. Elmes presses are fast, flexible, convenient—give you *precise control* over speed and pressure, instant response to push-button operation. Full power at any point in the stroke. Adjustable travel. Rapid traverse.

For drawing, stamping, forming, coining, embossing, heading—for accuracy, speed, longer die life—for any purpose and service, Elmes hydraulic presses give you better work on long runs or short—and *lower production costs.* "Put *Your* Pressing Problems up to Elmes."

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ELMES high-speed, single-action metal working press, Model 6925, is illustrated. Fast ram advance and return. Pressing speeds: 140″/min. (300 tons); 320″/min. (115 tons). Makes around 15 cycles per minute on a 3½″ draw. Bed size: 72″ x 48″. Stroke: 30″. Automatic protection against over-travel and over-pressure.

TO FACILITATE DIE SETTING, switch the press to "inching control." Slide then descends at pressing speed, and only while "down" button is held depressed; opens only while "up" button is depressed. A low-value setting of the pressure switch gives additional protection to light dies—saves time, trouble, money.

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Power Presses of all Kinds

Eyelet Machines

Small Arms Ammunition Machines

Collapsible Tube Machines

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New Developments

imbedding each of its tiny grains (about .003-inch in diameter) in a pellet of conventional smokeless powder. This sets off thousands of small bursts of high energy behind the bullet, without generating uneven or dangerously high pressure in the weapon's bore. The new propellants have been tested in both military and sporting cartridges.

WIND TUNNEL-BURNER LABORATORY

A wind tunnel for the study of the problems of supersonic flight and a burner laboratory for testing ram-jet engines developed by the Applied Physics Laboratory of Johns Hopkins University for the Navy Bureau of Ordnance are currently in operation at Daingerfield, Tex.

One of the largest operating supersonic wind tunnels in the world, the Daingerfield facility has a test section measuring 19 x 27.5 inches, which provides 3.6 square feet of experimental cross section. Air speed in the tunnel ranges up to 1,800 miles an hour or 2½ times the velocity of sound.

HIGH ALTITUDE TUBE

A new vacuum tube design for use on high voltages at altitudes up to 60,000 feet has been announced by the Amperex Electronic Corporation. The development work was sponsored by the Air Matériel Command of the U. S. Air Force and the tube is especially important in control circuits of guided missiles. Base of the tube is of glass and is tapered and ground to fit the socket like a glass bottle stopper. This construction excludes all air which, at high altitudes, causes flashover between terminals.

SEA

NAVY PLANS ROCKET TESTS

The Navy has admitted that it definitely plans further rocket tests at sea, but said no firing schedule has been made and declined to reveal the nature of the rockets to be used in future tests.

Vice Adm. Forrest P. Sherman, Deputy CNO for Operations and an eyewitness to the firing of a V-2 from the deck of the U.S.S. MIDWAY, said the Navy obtained "a great deal of valuable information" from this initial test, despite the erratic performance of the giant missile.

He disagreed emphatically with unidentified Army Ordnance experts who have been quoted as saying guided missiles, such as the V-2 can't be fired accurately at sea because of the pitch and roll of ships.

Data collected from the V-2 test already is under careful study, but Admiral Sherman opined that "lots more" is needed before work will be resumed on the battleship KENTUCKY and the battle-cruiser HAWAII, new guided-missile vessels.

RADAR FIRE CONTROL

A recent report revealed that the Navy has designed a 3-inch twin automatic gun which may be an answer in part to the missiles of the future.

It will be equipped with a revolutionary radar fire-control system by which the mount automatically picks up any enemy aircraft or missile, tracks it, computes all necessary corrections for windage, temperature, and similar factors, and opens fire at effective range.

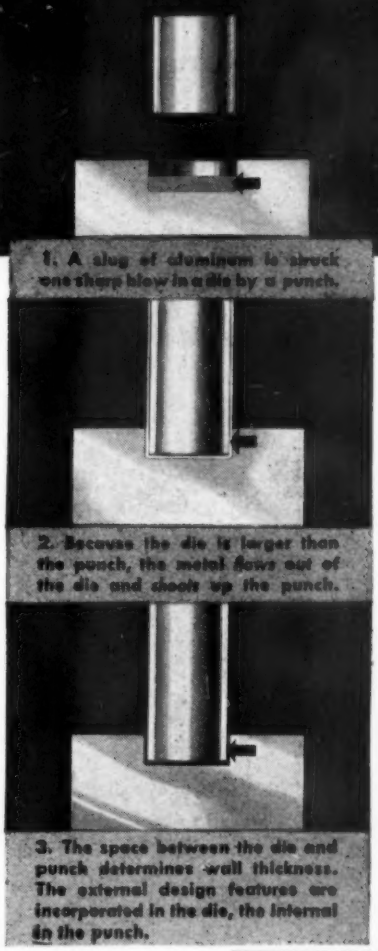
NEW NAVY SEAPLANE SLIP

A self-propelled floating seaplane berth, which moves out from shore to simplify the mooring of water-borne aircraft, has been developed and successfully tested by the Navy Bureau of Yards and Docks.

Built of pontoons, the new seaplane slip operates along a 600-

Made in one wallop to withstand 900 wallops per minute . . .

it's an ALCOA IMPACT EXTRUSION


1. A slug of aluminum is struck one sharp blow in a die by a punch.
2. Because the die is larger than the punch, the metal flows out of the die and shoots up the punch.
3. The space between the die and punch determines wall thickness. The external design features are incorporated in the die, the internal in the punch.

This valve lifter for a heavy-duty diesel engine operates up to 900 strokes per minute and has to maintain a clearance of from 0.0025″ to 0.0035″. The best way to make it at lowest cost, with the fewest machining operations, is as an Alcoa Aluminum Impact Extrusion. The metal is Alcoa 14S Aluminum, with a typical tensile strength of 68,000 pounds.

Almost any part that is generally symmetrical can be impact-extruded. The dimensions are close and accurate . . . less finish machining is required.

Some intricate parts that could not be made by any other process are readily designed to be impact extrusions . . . you can let your design ideas take on new, moneysaving slants. Aluminum is light to reduce loads and inertia, strong to bear weight and impact.

Let us show you samples of parts that have been made as Alcoa Aluminum Impact Extrusions. ALUMINUM COMPANY OF AMERICA, 2137 Gulf Bldg., Pittsburgh 19, Pa. Sales offices in leading cities.

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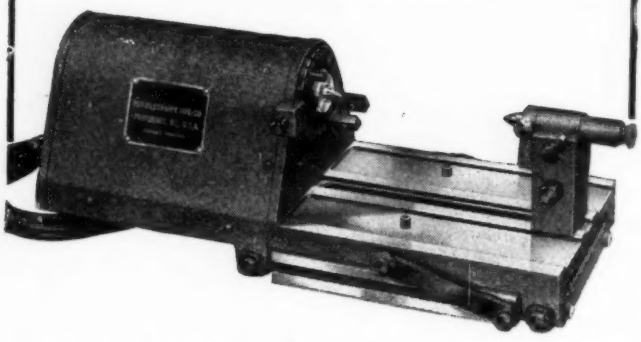

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• For dry grinding small cylindrical work, tapers and work requiring indexing, the new Brown & Sharpe Cylindrical Grinding and Indexing Attachment extends the usefulness of surface grinders. It often saves installation of extra cylindrical grinding equipment.

Straight cylindrical or tapered work is ground between centers or, if ½" diameter or less, can be held in the indexing spring chuck. Indexing is performed with headstock index plate or with interchangeable indexing spring chuck.

Centers swing 6" diameter, take work 5¼" in length. Maximum grinding angle, 45°. 1/60 H.P., 115 V., A.C. motor is completely enclosed. Write for illustrated folder. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

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New Developments

foot submerged cable and can be swung about in any direction to permit a plane on the water to taxi into the wind while entering or leaving the slip.

The mooring of a seaplane in the movable berth is further simplified by the slip's bell-mouthed entrance and by a system of six water jets, three on each side of the entrance, which push the plane from one side of the slip to the other.

TRANSPORT HELICOPTER

The Piasecki HRP-1 now being built for the U. S. Navy is by far the largest cargo-passenger transport-type rotary-wing aircraft in the world to be put into production. Powered by a Pratt & Whitney 600-horsepower engine, it can ascend vertically with a ton of useful load and accelerate to speeds of over one hundred miles an hour. Normally designed to carry a crew of 2 plus 8 passengers, the HRP-1 can also be used to carry 6 litter patients or serve as a rescue aircraft within ranges of 300 miles.

AIR

NEW ARMY AIRCRAFT

The Air Force has been developing a number of new type bombardment and fighting aircraft, the most outstanding of which are discussed below:

Delivery of the B-36—the 6-engined, pusher-type, long-range bomber—to the very heavy bombardment squadrons of the 7th Bombardment Group, Eighth Air Force, at Fort Worth, Tex., has begun. It is contemplated that the B-36 will replace, eventually, the B-29 Superfortress with which the 7th Bombardment Group is presently equipped.

The Army's XB-47 6-jet-engined bomber, the Boeing Stratojet, is an experimental model to test the new in design. Approximately the size of the B-29 Superfortress, its sharply swept back wing and tail surfaces are ultrathin to decrease air resistance at high speeds. The six engines are carried under the wing surfaces, three on each wing. Two of the three are in a single housing close to the fuselage; the third is well out, relatively near the wing tip in an unusual position.

Another 6-jet bomber, the XB-48, is under flight tests at the Glenn L. Martin plant near Baltimore. Its engines are in banks of three under each wing. It is a long-range plane, capable of over 480 miles an hour, and can carry a bomb load of over 10 tons.

The Air Force's first 8-jet bomber, the Northrop YB-49 "Flying Wing," has successfully completed its first test flight and is undergoing further flight testing. The YB-49, a jet-propelled version of Northrop's XB-35, spans 172 feet across the wing, but is only 53 feet long, due to the absence of the conventional fuselage. The crew capacity of the jet-propelled bomber is thirteen men, including a pilot, copilot, navigator, radio operator, flight engineer, bombardier, and gunner, with provision for six reserve crew members for relief duty on long-range missions. The YB-49 is controlled by "elevons," control surfaces which perform the functions of both elevators and ailerons.

The XP-86 is a single-seat fighter with a wing span of thirty-seven feet and length of twenty-seven feet. With its wings and tail surfaces angled rearward at almost 45 degrees to reduce the adverse effects of compressibility, the new fighter is designed to top a speed of better than 650 miles an hour. It is powered by a single General Electric J-35 axial-flow jet plant which develops 4,000 pounds' thrust.

The Curtiss XP-87, the Air Force's newest fighter airplane and the first ever powered by four jet engines, has begun its ground and taxi tests. Operated by a 2-man crew, the airplane has a wing span of approximately sixty feet and an over-all length of approximately sixty-five feet. (*Continued on p. 220.*)

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In either case, let Arnold's engineering service help you to find the answers to your magnet problems. Arnold offers you a fully complete line of permanent magnet materials, produced under 100% quality-control in any size or shape you require, and supplied in any stage from rough shapes to finish-ground and tested units, ready for final assembly. Write direct, or to any Allegheny Ludlum branch office.

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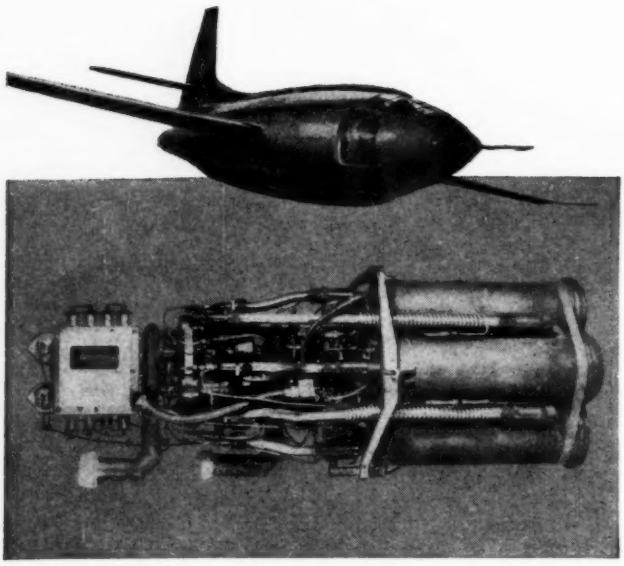
NEW ROCKET ENGINE FOR SUPERSONIC PLANE



built with a "heart" of Stainless Steel Tubes

With full rocket blast, this engine develops 6,000-pounds thrust – sufficient to crash through the "sonic barrier" and propel a plane at speeds up to 1,700 M.P.H.

The combustion chambers and the manifold tubes, which the manufacturer* describes as the heart of the engine, are made from Seamless Stainless Steel Tubes.

Stainless Steel Tubes made by the seamless process were used to assure maximum heat resistance, strength, and safety without adding unnecessary weight. No other tubing surpasses stainless steel for high temperature applications like this.

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UNITED STATES STEEL

New Developments

DESIGNATION OF BOMBERS

In order to eliminate any confusion which may exist in regard to class designation of bombardment aircraft, U. S. Air Force Headquarters has issued the following official descriptions:

Heavy Bomber.—Over 2,500 nautical miles tactical operating radius at design gross weight and design bomb load (B-35, B-36).

Medium Bomber.—Tactical operating radius of 1,000 to 2,500 nautical miles at design gross weight and design bomb load (B-29, B-50).

Light Bomber.—Under 1,000 nautical miles tactical operating radius at design gross weight and design bomb load (A-26, B-45).

Tactical operating radius is defined as three-eighths of the optimum range at optimum cruising speed and altitude, at design gross weight and design bomb load.

JET "AFTER BURNER"

Installed downstream from the turbine of a conventional jet engine, a device called an "after burner" can add more than one-third to the power plant's normal propulsive thrust, giving

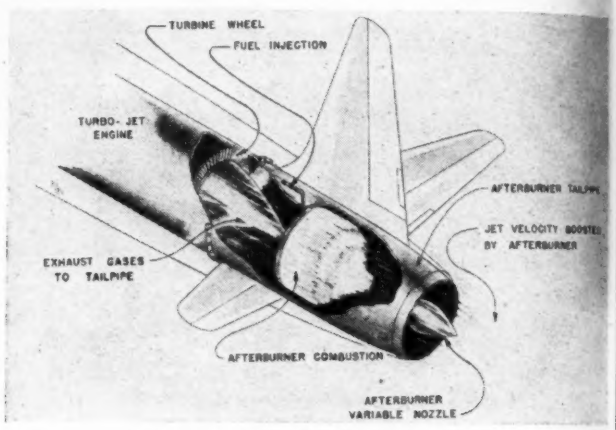

Diagram of the afterburner in action.

added power for take-off during combat conditions and on all occasions where extra speed is required. This is accomplished by spraying fuel into the tail pipe where its combustion adds mass and velocity to the gases of the jet stream.

This after burner, developed by the Ryan Aëronautical Company, is in effect a ram-jet engine attached to a turbo jet.

CROSS-WIND LANDING GEAR

A cross-wind landing wheel developed by the Goodyear Tire & Rubber Company, permitting aircraft to land on one-runway airports regardless of wind direction, has received the first approved type certificate ever given by the Civil Aëronautics Administration for such a device. The wheels act like casters to allow aircraft to counteract strong crosswinds blowing as much as ninety degrees across runway headings.

WORLD-WIDE RADIO

Air Force strategic air commanders can now exercise direct and instantaneous control over their bombers and fighters while such aircraft are in flight anywhere in the world. This is made possible by the development of what is known as a "rotary-beam parasitic array antenna" which can be rotated to point in the direction of a plane and "follow" it in flight.

MAPS BY RADIO

The Air Force is planning to use facsimile equipment, a form of visual message presentation quite similar to television, so that aircraft in flight can receive maps, pictures, and reports.

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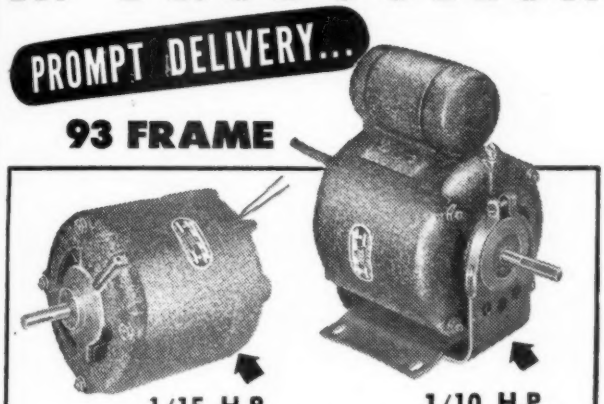

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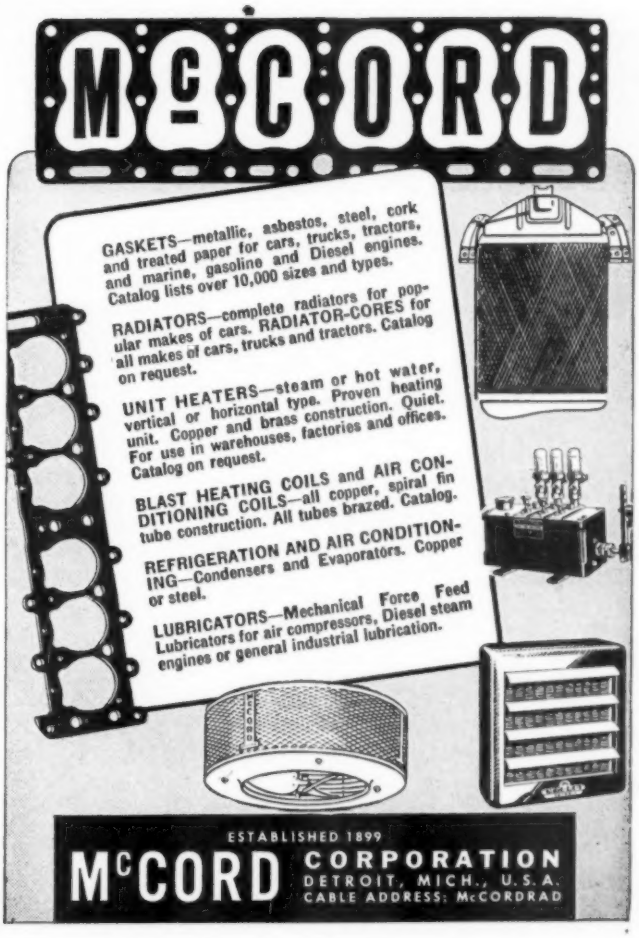

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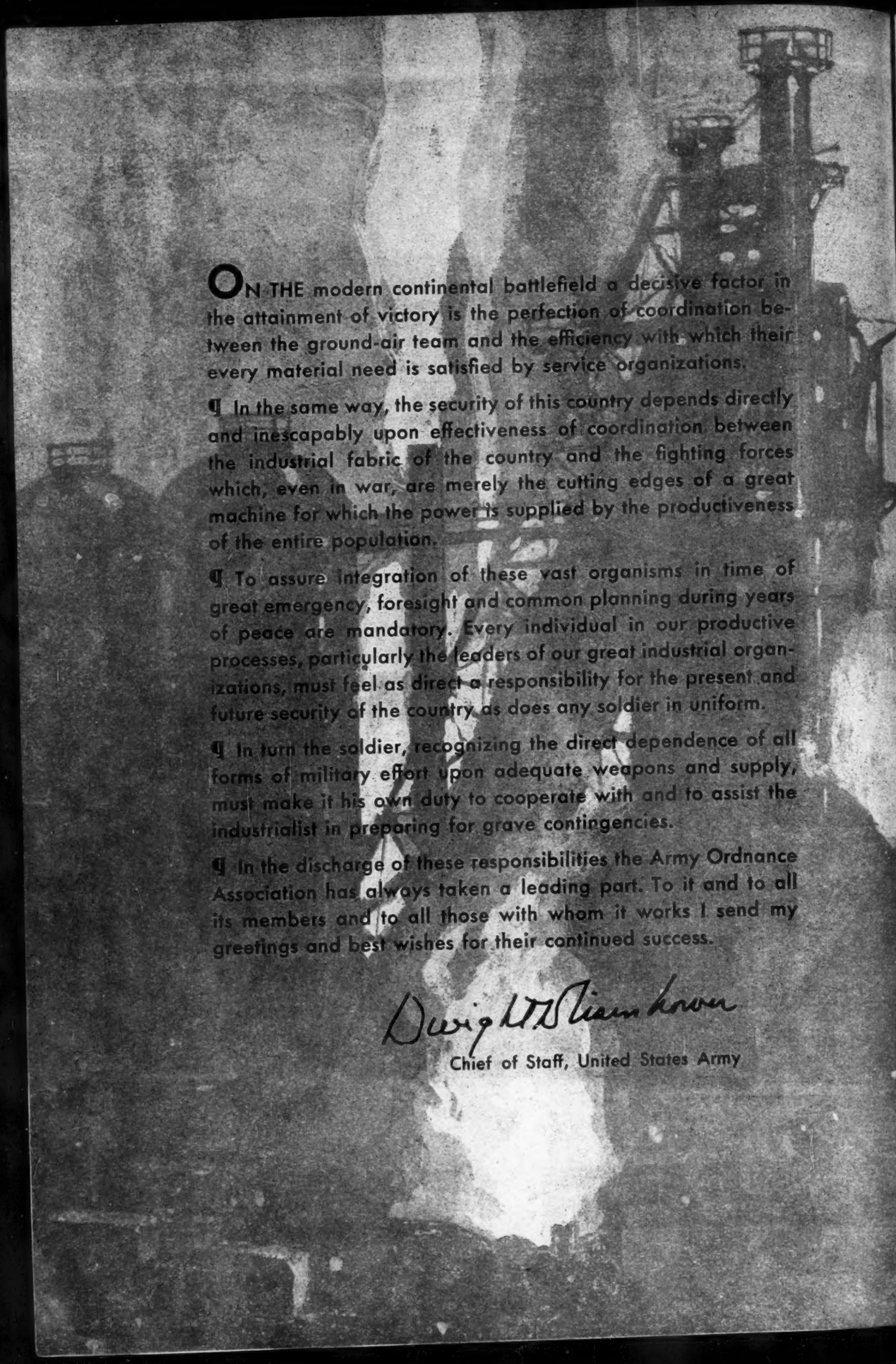


ON THE modern continental battlefield a decisive factor in the attainment of victory is the perfection of coordination between the ground-air team and the efficiency with which their every material need is satisfied by service organizations.

¶ In the same way, the security of this country depends directly and inescapably upon effectiveness of coordination between the industrial fabric of the country and the fighting forces which, even in war, are merely the cutting edges of a great machine for which the power is supplied by the productiveness of the entire population.

¶ To assure integration of these vast organisms in time of great emergency, foresight and common planning during years of peace are mandatory. Every individual in our productive processes, particularly the leaders of our great industrial organizations, must feel as direct a responsibility for the present and future security of the country as does any soldier in uniform.

¶ In turn the soldier, recognizing the direct dependence of all forms of military effort upon adequate weapons and supply, must make it his own duty to cooperate with and to assist the industrialist in preparing for grave contingencies.

¶ In the discharge of these responsibilities the Army Ordnance Association has always taken a leading part. To it and to all its members and to all those with whom it works I send my greetings and best wishes for their continued success.

Dwight D. Eisenhower

Chief of Staff, United States Army

Total Mobilization

The Rôle of the National Security Resources Board

Arthur M. Hill was serving either as president, chairman of the board, or director of no less than twelve corporations when he was chosen by President Truman to be chairman of the National Security Resources Board. He is probably best known as a transportation executive.

A native of Charleston, W. Va., Mr. Hill was educated at the Central Missouri State Teachers' College. The early part of his life was spent in the West, two years of which were in an Arizona mining camp.

In World War I, Mr. Hill was assistant chief of staff of the 77th Division and was graduated from the Army General Staff College at Langres, France.

In 1940, Mr. Hill was consultant to Ralph Budd in the National Defense Advisory Council, later becoming a consultant to the late Hon. Joseph E. Eastman, Director of the Office of Defense Transportation.

During World War II, Mr. Hill was special assistant to the Secretary of the Navy, chairman of the Secretary's Committee on Public Works Projects, and Navy Rubber Director.—EDITORS.

TWO basic factors must be considered in planning for our future security in the field of natural and economic resources.

The first lies in the nature and extent of the impact of war on our national life. Our mobilization during World War II did not tax our resources to the greatest possible extent.

From war to war, however, more types of weapons are used; they become larger in size and number, more mechanical, more scientific, and more complex. More man-hours, more machine-hours, more facilities, and more raw materials are needed in their manufacture. The productive capacity on the home front to support the armed forces increases proportionately. The ratio of the men behind the guns to the men manning the guns is ever expanding.

The second basic factor in connection with industrial support of the military establishment is that of timing. In both previous wars we had time to organize our war production in relative safety. With the increased range of future weapons and with the knowledge that the United States has been the decisive factor in two world wars, there is little likelihood that we will be granted such a respite again.

This means two things for the future: First, we must have available definite and immediately workable plans to organize for war our entire government and our entire national life on short notice. Secondly, and more importantly, it also means that everything that cannot be done promptly after the outbreak of war must be in a state of readiness ahead of time.

The National Defense Act of 1947 recognizes the need for better planning and coördination in the utilization of our resources for any possible future war. In furtherance of these objectives, the Act establishes the National Security Resources Board to advise the President concerning the coördination of military, industrial, and civilian mobilization. Supplementary to this broad responsibility, the Act includes within the purview of the Board:

1. Policies concerning industrial and civilian mobilization in order to assure the most effective utilization of the Nation's man power in the event of war;

2. Programs for the effective use in time of war of the Nation's natural and industrial resources for military and civilian needs, for the maintenance and stabilization of the civilian economy in time of war, and for the adjustment of such economy to war needs and conditions;

3. Policies for unifying, in time of war, the activities of Federal agencies and departments engaged in or concerned with production, procurement, distribution, or transportation of military or civilian supplies, materials, and products;

4. The relationship between potential supplies of, and potential requirements for man power, resources, and productive facilities in time of war;

5. Policies for establishing adequate reserves of strategic and critical materials and for the conservation of these reserves;

6. The strategic relocation of industries, services, government and economic activities, the continuous operation of which are essential to the Nation's security.

AS chairman of the National Security Resources Board, Arthur M. Hill is responsible directly to the President. He brings to his new executive position a wealth of logistical experience as director of one of the largest and most efficient transportation systems in the country. His highly specialized training eminently qualifies him for the post.

Mr. Hill's immediate task falls into three major categories:

He must determine the status of our national resources in terms of materials, industrial plant, man power, and the other essential factors of our economic life;

He must continuously review current problems in the light of our economic readiness for a possible war;

He must develop comprehensive and detailed plans to cover the administrative machinery that would be necessary in case of war to channel and control production for the war effort and, at the same time, protect to the maximum possible extent our civilian economy.

CHIEF OF STAFF *General Dwight D. Eisenhower recently sent this message to the Army Ordnance Association.*

Keeping the Peace

K. T. Keller

President, Chrysler Corporation

Speaking before the Cincinnati Post of the Army Ordnance Association, Mr. Keller advocated "internships" for military and industrial personnel as an aid to preparedness

Mr. Keller was awarded the Charles L. Harrison Medal for Distinguished Ordnance Service by the Cincinnati Post, Army Ordnance Association, on October 22, 1947, with the following citation: "For his leadership in mobilizing industrial resources in World War II; for his contribution to the design, building, and operation of the Detroit Tank Arsenal and Automotive Center; for his service as adviser to the Chief of Ordnance, U. S. Army; for his part in the production of ordnance, aircraft, naval, and atomic matériel of the highest strategic importance; for his devotion to the cause of industrial preparedness as an assurance of peace."

I SURMISE that neither the war years behind us nor the gloom that so often surrounds the future nowadays have in any way lessened your love of peace.

They have not, I am sure, lessened your determination to do everything you can toward establishing and maintaining peace so that your children and grandchildren may enjoy the fruits of your devotion to the advancement of mankind.

Today as never before the good citizen is the one who thinks, talks, and lives peace. Without yielding to hysterical notions of mass extermination, we cannot compute the cost of another world struggle as anything but universal ruin.

My own strong attachment to the Army Ordnance Association is based on the belief that it is one of our most active instruments for peace, that its mission is not to arouse the Nation for war but rather, through intelligent preparedness, to avert war—to make it impossible.

After all else has been tried, our possession of the most effective weapons and of the means and will to swing into action will stand as the potent reasons compelling disputing peoples to use only peaceful methods.

If, for one moment, I doubted that our program in this Association did not greatly increase our chances of maintaining a just peace, I would turn my back on it and seek other means to foster orderly solutions of international difficulties.

There will be times when, as taxpayers, the cost of maintaining national security through preparedness will seem burdensome, and many of us will be tempted to skimp it. To businessmen, proper expenditures of this sort make sense. They are quite parallel to the expenditures we make in our own affairs for insurance against fire, theft, or any form of disaster.

Increased Watchfulness

The presence of these items in our overhead does not forecast the burning down or carrying away of our property, nor are we tempted to skimp these safeguards for a momentary improvement in earnings.

On the contrary, awareness of this burden increases our watchfulness and pushes us to institute new and better security measures and to improve the premises and equipment. The net result is a constant lessening of the risks of disaster.

The safety and health record of employees in American industry is a product of the same type of thinking and expenditure. Our own company has put more than five million dollars into operation of medical services and industrial hygiene laboratories within the past ten years. We have spent a half million dollars on new medical buildings and equipment since the end of the war.

We count it a sound expenditure to have every new employee given a chest X-ray—a quarter of a million such X-rays in five years. No new substance enters our manufacturing processes anywhere without passing analysis from the hygiene standpoint.

All this essentially is preventive work. It is similar, in principle, to maintenance of strong national-defense establishments.

Precision tools such as this multiple drill used in making 3-inch guns is a result of planning and applying industrial techniques to our ordnance problems.

There is universal acceptance today of the thought that the single greatest contribution that can and must be made to preparedness is to close the gap between the time when war becomes inevitable and the time when civilian industries have their enormous potential swung into line behind the combat forces.

The objective is much more simply stated than achieved. The men who will be spending full and part time on its realization will require a certain amount of genius to keep on a practical and effective track.

How are the great majority of us to serve this end effectively?

I feel that just belonging to the Army Ordnance Association is a specific way of doing something about it. The conscientious citizen, however, will want the feeling of doing more, of being still more effective.

In many ways this task we set ourselves is very much more difficult than the work which engaged us all so completely throughout the period of the war.

Buoyed by Results

During that time of nerve-racking strain, every man was buoyed up by the fact that what we were doing was concrete and measurable. Every available unit of energy and time was engaged. The obstacles and challenges were unending. But as these were overcome, tangible, visible results were before our eyes.

The target was in things to be made. The work accomplished could be measured at the end of the day, at the end of the month. Finally it could be measured with satisfaction as the products of all these efforts brought the end of the conflict in sight.

Today we must keep our eye on a much less measurable objective. The man of action lacks the definite agenda that supported and inspired him throughout war production days.

If we are to do our full part in the peacetime world, most of our attention and energy must be concentrated on other time-filling activities. Our contribution to national security becomes a sideline, sometimes perhaps even a vague one.

We know that actual industrial production for the armed services will be no more than a collection of token projects for an extended period of time.

This means that the front line of defense activity has been transferred to other fields. In the research lab, a limited number of competent people will contend with problems that are quite as tough if not tougher than most of those encountered in World War II. The pace of progress there is likely to be measured in months and years, not in hours and days. Most of us cannot help directly and should not try to breathe down the necks of these specialists.

Another limited number of persons will have their energies properly absorbed by mobilization planning. They face the superlative difficulty of dealing with far more unknown factors than known ones. The great majority cannot make any truly useful contribution to such planning.

A further limited number of people will find an outlet in active liaison with specific military projects. Industry's advice, much of it rendered through this Association, already has proved valuable, and more of it will be needed.

But whether, individually, we have the opportunity for this kind of service or not, I do not believe that it should be considered a true measure of the contribution each of us can make to the objective of preparedness.

Without in any way detracting from these excellent activities I maintain that the number of committees on which a man serves and the number of hours he devotes to their objectives is not the real yardstick of his usefulness. It goes without saying that we must never fall into the error of taking satisfaction from "made work"—activity generated for the sake of doing something. This kind of thing can blind us to the lack of true progress until it is too late.

A.O.A. Can Serve

The duty of standing for an adequate military establishment and, if necessary, reminding our representatives in Government of that need is there for us all. In it members of this Association can be more useful than most citizens, perhaps, because you and I know so intimately what a slow and difficult process it is to build up from nothing.

When all the facts are put in perspective, it seems to me that there is one most basic assignment before each of us—one thing we can do without requiring special position in relation to immediate activities—one which in time will yield the maximum result. That is to keep alive an intimate acquaintance between the personnel of industry and the personnel of those segments of the

"TO my mind, Cincinnati always has been a capital of craftsmanship. Its name has been synonymous, since my apprentice days as a machinist, with high individual skill—with perfection of work attained by groups of men of exceptional ability with a rounded knowledge of the mechanical arts.

"Our industries in Detroit grew also with the use of this same kind of high skill and with what the world knows as mass production. In our own language it is "engineered production"—the art of using machines to put into the hands of men of average attainments the ability to make interchangeable parts of high precision by the thousands.

"It seems to me that World War II finally brought about the complete marriage of the two principles of craftsmanship and volume production. Our industries turned out on the production-line plan very great quantities of mechanical products which embodied such delicate precision that it is safe to say they never before have been surpassed in perfection of fit and tolerance by any industry. Such items as gyrocompasses, for instance, fully matched the standards of the chronograph-maker's art.

"In Cincinnati, and in other centers of machine-tool production, the staggering demands of war were met without the sacrifice of precision standards. Your industries accomplished this by employing with complete success the principles of engineered production.

"Under the guidance of your most skilled men others were enabled to perform individual operations with precision. You were able to expand beyond your own walls by resorting to subcontracting on a great scale without sacrificing the quality of your product.

"In this period I believe our respective industrial communities attained a mutual respect for one another that exceeds and strengthens the long-standing friendliness and coöperation of previous decades. It brings us closer than ever.

"Beyond its industrial prowess Cincinnati has won a place for itself among the cities of the world where the culture and the arts of peace have been treasured, advanced, and developed since pioneer days."—K. T. KELLER.

military forces that are directly concerned with industrial production: individuals in industry on one side; individuals in the Army, the Air Force, and the Navy on the other.

If you take stock of what you personally know of such relations today, you may even feel that to say "keeping acquaintance alive" is an understatement. It could properly be said that we should get *reacquainted* for there is so much change going on in both groups. It is perfectly amazing what two years have done already to alter the two sets of management and even the structure of institutions behind the management.

This change will continue at a gradual but steady pace. We shall see tried friends and proved performers in many key places for a long time, but we need to think primarily in terms of acquaintance between people who will be in command at critical points years hence.

This may seem to some people to be small stuff, undramatic activity, perhaps inadequate to these troubled times. Some may feel it is more important to stir up a vigorous burst of alarm at the state of world affairs. Of course, we must keep aware of these things.

"Crisis" and Security

Yet I cannot bring myself to believe that the cause of national security is advanced one bit by crying "crisis."

In the period preceding Pearl Harbor, popular feeling was whipped up before it had a program to support. As a result, whole industries were being denounced for not producing materials which had not been ordered and weapons which had not, in all cases, been designed. That distrust and suspicion furnished an extra hurdle to performance when the opportunity to act arrived.

A state of hysteria over the possibility of war or over the possible catastrophic nature of another war cannot conceivably help bring about collective effort.

By contrast with that public distrust which, prior to the last war, generated so much difficulty was the trust and mutual respect which came to be established between the armed services and industry. It was, I am sure, the indispensable ingredient in the successful accomplishment of the industrial production for war. To attain that trust it was necessary to understand one another's problems.

It sometimes took considerable time and experience to reach the point where such understanding could exist, for many of the participants on either side were new to the relationship between private industry and the armed forces which the war expanded so enormously.

Greater Collaboration

We never exactly repeat previous experiences. Each new one begins from the last point of development. In the future the armed services and industry will be many times as interdependent as they were in 1941. They will therefore have to start out on a much more developed basis of collaboration than they had at that point.

When the war ended—by the time production contracts were canceled and settled and plants cleared and reconverted—we had been given splendid demonstration that this mutuality of confidence and ability to work together were proved and true.

But you cannot take such an intangible relationship and easily transmit it to a successor. You cannot file it for future reference and expect to pull it out some day, dust it off, and find it in working condition.

Likewise, it is not possible to compile and put away a record book of what any given industrial aggregations are capable of accomplishing and then drawing it out five, ten, or fifteen years later and proceed to parcel out new business on the basis of the results set down long ago.

Aquaintances Are Important

We in industry, whether we manage a company, superintend a division, or are part of a staff which would be involved in any future war production, definitely need to be acquainted with the successors of the men for whom we produced in the last war.

It is a direct asset to each of us to know who are the men in various key commands and those in charge of activities under them. We need to know how their responsibilities and functions are being modified or redistributed. We need to know, too, what these men know of the industries upon which they may have to call and how well they understand the manner in which these concerns do business.

It is equally necessary, from the standpoint of the Ordance officer, to have the opportunity to know the trend of industrial changes and to have an informed acquaintance with the new men who are coming up all the time to places in management and the policy-forming level of industry.

The armed services have recognized this need in many ways. To mention one, during the past year they have had a considerable number of junior officers from the various services out studying industrial organizations, living with them day by day. This is a practical and positive step for the military side of the team in peacetime.

Military "Internships"

On the industry side of the team, some may be able to develop comparable types of practical internship with the military groups. But the simple, studied plan of getting acquainted at every opportunity and then purposefully keeping acquainted as time goes on will furnish the surest, quickest bridge to that coöperation which we might again have to call upon.

The real progress, however, will be made through the program instituted by the services in placing officers in industry for short periods of their training. It will be made by ourselves in industry seeing to it that our younger and coming executives are intimately tied into the Ordnance Association and its activities.

Not "Old Home Week"

Let us not allow the annual trek to Aberdeen to become "Old Home Week." We must see that the young men get there and that the program arranged for them there is not a dry report of past accomplishment but one that stimulates a creative approach to the future.

A new pilgrim to Aberdeen should come away inspired with the importance of the rôle he can take up in our program of national defense.

In that kind of a setting, the work of the individual Posts and industry Divisions of this Association will take on real body and vitality.

With a background of informed understanding the development work of laboratories and of proving grounds, in the services and outside, will find an outlet of practical nature. The hurdle to be crossed in translating new products of engineering into designs which can be turned out by volume methods will be halfway crossed. The problems of emergency industrial mobilization will be started on the road to solution.

Advisers to Ordnance

The Rôle of the Technical Divisions of the A.O.A.

by

Harvey C. Knowles

"Teamwork is one of the first rules of a democracy, and it is teamwork when the best men in industry and men who knew all the problems of the shooting war work side by side with Ordnance."

WE have our industrial problems here in America, working as we do as individuals under our free enterprise system, but we feel the returns are so great that our way is the best way. However, it does put a responsibility on every one of us to do our part under a procedure which makes good American sense because it is well thought out, squares with the facts, and gives us results under our way of living.

The Technical Divisions of the Army Ordnance Association have a creed, or objective, or whatever you choose to call it, that we try to follow. In doing this, we have chosen from our 40,000 members men who went through the problems of the last war. These are the men who were called upon by Ordnance to do a job and who gave their best efforts. They were the contact and production men of the time. They are men of authority and wide knowledge of our problems. These men are formed into A.O.A. committees representing different branches of Ordnance and act in an advisory capacity to Ordnance.

Mr. Knowles is vice-president of the Army Ordnance Association; chairman of the Association's Rocket, Bomb, and Artillery Ammunition Division; and vice-president of Procter & Gamble Company, Cincinnati.

These remarks at the Ordnance Clinic of the Twenty-ninth Annual Meeting of the A.O.A., held in the Waldorf-Astoria, New York City, on October 1, 1947, sounded the keynote for the work of the Association's Technical Divisions.

No Interference

This type of committee does not interfere, in any way, with orders placed by the Ordnance Department on universities, engineering societies, or corporations to solve specific problems. Ours is a group of individuals spread across the country. We stand side by side with Ordnance in an advisory capacity and, for consultation, are as close as the nearest telephone.

If General Hughes wants to check on something this afternoon, all he need do is pick up his telephone and call Mr. Davis in Bridgeport, or whoever it may be. The man called will check with experts, the very best that local industry has to offer. The experts consulted will be back in an hour or so with their ideas.

In addition, the problems requiring study by committees and men well versed in technical subjects will be passed on from Ordnance to the Technical Divisions, the committees giving their best in reporting back to Ordnance.

If industry does have any experience and expert advice to offer, I don't know of a better way to relay it to the Ordnance Department.

Looking back at the two years since V-J Day we all recognize the tremendous problems the armed forces have had due to demobilization. We recognize the job which has been done in the greatly reduced organization. We all went through the early 1930's when every one from the President down was asking how to cut the defense

Harvey C. Knowles

organization and save money. Everybody remembers that phase, but it hit the armed forces with ten times the intensity with which it affected industry.

We recognize the careful analyzing and evaluating that the services have done in following up their recent wartime experience. They have had problem after problem of all types to face.

Teamwork

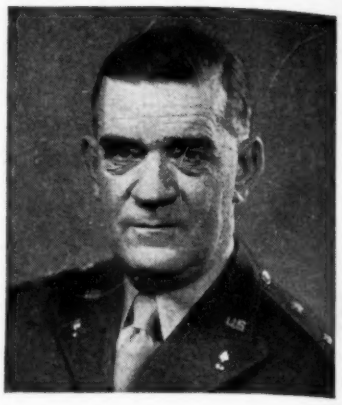
Teamwork is one of the first rules of a democracy, and it is teamwork when the best men in industry and men who knew all the problems of the shooting war work side by side with Ordnance.

When you think of our country versus some of the European countries, you realize what a tremendous job has been done here in research and experimental work through the years. In the twenty years before 1940, for example, something like a billion dollars a year of American money was invested in research. So today we say, "Let's start now with all the knowledge available." We are just getting under way and in 1947 have made a fair start as the following reports from the various A.O.A. committee and Technical Division chairmen will indicate.

Ordnance Progress

A.O.A. and the District Organizations Form a Smooth-Working Defense Team

Maj. Gen. Everett S. Hughes



General Hughes, Chief of Ordnance, U. S. Army, delivered these remarks during the Twenty-ninth Annual Meeting of the Association at the Waldorf-Astoria, New York City, October 1, 1947.

INDUSTRIAL mobilization and all aspects of quantity production are the responsibility of the mass producers of the United States. I can prove that, if necessary, by showing you some answers which we have received recently in the Ordnance Office to questions which we asked Mr. Knowles' committee.

I think that twenty questions were proposed to the committee, and six of those questions have been answered. They have been answered in such a fashion that the answers can be incorporated without change in the Ordnance Industrial Mobilization Plan.

Careful reading of that document indicates that there are thoughts expressed in those answers which nobody in uniform would ever have thought of. That has been the record right along!

The first trial we made of the services of the Army Ordnance Association was the proposal that some of the civilians who had been Ordnance district chiefs or who knew something about the district work would give us their ideas as to the future of the district offices.

After careful study, we received the document which we now call the Bell Report and which forms the basis of our district work. We have accepted the document in toto, and we feel it is not only right but that we have the backing of prominent civilians in carrying out that plan.

Industrial Mobilization

I would like to indicate the methods which we have adopted in the Ordnance Office for getting this job of industrial mobilization started and completed.

First of all, the Army Ordnance Department has fourteen Ordnance districts located from coast to coast. Those districts are well defined, and in most cases there are shadings of various forms of industry in them which make them "ordnance departments" by themselves.

Then we utilize the services of the technical committees of the Army Ordnance Association to solve for us general problems which are more or less universal in nature. By this method, we are able to secure answers to local problems—such as a problem which originates in San Francisco, or Boston, or any of the other districts—by reference to the district chief in that particular area.

But when it comes to matters involving questions such as whether or not loading plants should be huge affairs of 40,000 or 50,000 acres which make fine aërial targets, industry responds with an answer that in its opinion such large loading plants are not necessary, that they are too visble under the type of warfare which we may expect, and that it would be far more preferable to have a large number of complete but smaller plants spread around the United States.

Crying "Uncle"

So we are getting something done, and I am proud to say that for the first time in my life I am being pressed on a preparedness subject. In other words, everybody on the technical committees of the Army Ordnance Association is crowding us now to the point where we are crying "Uncle." I think that is a very fine manifestation of a real interest in a vital subject.

As we go further along, more and more of industrial-mobilization work must be assumed by industry, and I can explain why very easily. We have already prepared our budget for the year 1949. It will go through the War Department system, through the Bureau of the Budget, and then to Congress.

There is not enough money appropriated by Congress to carry on industrial mobilization the way we in the services think it should be carried on. That is understandable, and I am not finding any fault at all. There is just so much money, and it has to be parceled out to the best of the ability of the people who are charged with that responsibility.

Nevertheless, we do not get enough money to revise all the drawings which need revision, to rewrite all the specifications which need rewriting, nor do we get enough money to manufacture and put into storage all the tools and fixtures which we require.

However, Congress has been very good to us from the standpoint of machine tools. Our war reserve of machine tools is growing constantly, and, I think, before many months, we will have, in combination with the Navy and the Air Force, the best tools this country has ever seen.

I have been in office now a little over a year and a half. and I feel that during that time I have seen a real, honest interest displayed in every particularly important problem, and I am delighted to say that as far as the Ordnance Department of the Army is concerned we are getting some of the very best qualified help that this world can offer!

From what I have seen, I think the industrial-mobilization problem is well on the way toward solution.

We have here, I think, the finest representation of all the people who can make a success of this job. We have the Secretary of Defense. We have the Secretary of the Army. We have the Navy and the Air Force. We have the combat troops. We have the industrialists of the United States. That, to my mind, makes a team which can never be beaten!

New Flight Frontiers

Air Force Developments Promise Close Industrial Contact

Brig. Gen. S. R. Brentnall

THE armed services are well aware that any future war will, in the main, be one of matériel. The military leader of today, whether he commands a force on the ground, in the air, or on the sea, must have an appreciation of the capabilities and limitations of his equipment. He must have at least a working knowledge of the fundamentals of the sciences which provide this equipment.

The Air Force, now nosing its way into a new era of flight, recognizes that the airplane, in its present form, is no longer the sole basis for our long-range planning for national defense.

Guided Missiles

In embarking upon a guided-missile development program our personnel at the Air Matériel Command are becoming acquainted with the complexities of a long list of new technical terms; transonic, supersonic, hypersonic, atmospherics, nuclearonics, and others—all of them representing challenging fields of exploration.

Our guided-missile basic research and engineering development program envisions weapons of the future in the contemplated categories of air-to-air, air-to-surface, surface-to-air, and surface-to-surface.

Simultaneously, and because we must accept the ever-present possibilities of warfare, we are still very much concerned with the subsonic airplane. It is conceivable that we might well be called upon to move, in a minimum of time, complete divisions of fully equipped ground troops over thousands of miles. Accordingly, we are concentrating considerable effort on that category of equipment involved in all-weather flying.

Arctic Operations

In view of the obvious strategic value of the Arctic regions, we are currently placing emphasis on what we call "winterization" of aircraft, aëronautical equipment, and personal equipment.

General Brentnall, chief of the Industrial Planning Division, Air Matériel Command, Wright Field, Dayton, Ohio, delivered these remarks at the Ordnance Clinic during the Twenty-ninth Annual Meeting of the A.O.A. at the Waldorf-Astoria, New York City, on October 1, 1947.

On the ground in the Arctic, we are encountering conditions so severe that we have been compelled to preheat the preheaters! Adequate protection of our personnel has demanded the development of specially adapted clothing.

Since V-J Day, new military characteristics have been established for four distinct types of fighter airplanes based on concepts derived from war experience: the penetration, interceptor, parasite, and all-weather types. The trend in bombardment aircraft is to establish three basic types—light, medium, and heavy bombers.

You are familiar with the XS-1 airplane, a product typical of the collaboration existing between the Air Force, the National Advisory Committee for Aëronautics, and private industry. This, as you know, was specifically designed as a research airplane and was instrumented for obtaining flight data necessary to conduct further applied research.

We have other research aircraft under construction which are unconventional in appearance. We hope that eventually these will provide us with needed additional findings beyond that expected of the XS-1.

Research

The NACA is the agency we look to, of course, for basic research in aërodynamics and thermodynamics. In other fields—electronics is a good example—there is no Government agency corresponding to the NACA, and it is, therefore, necessary that we engage in both research and development in those fields.

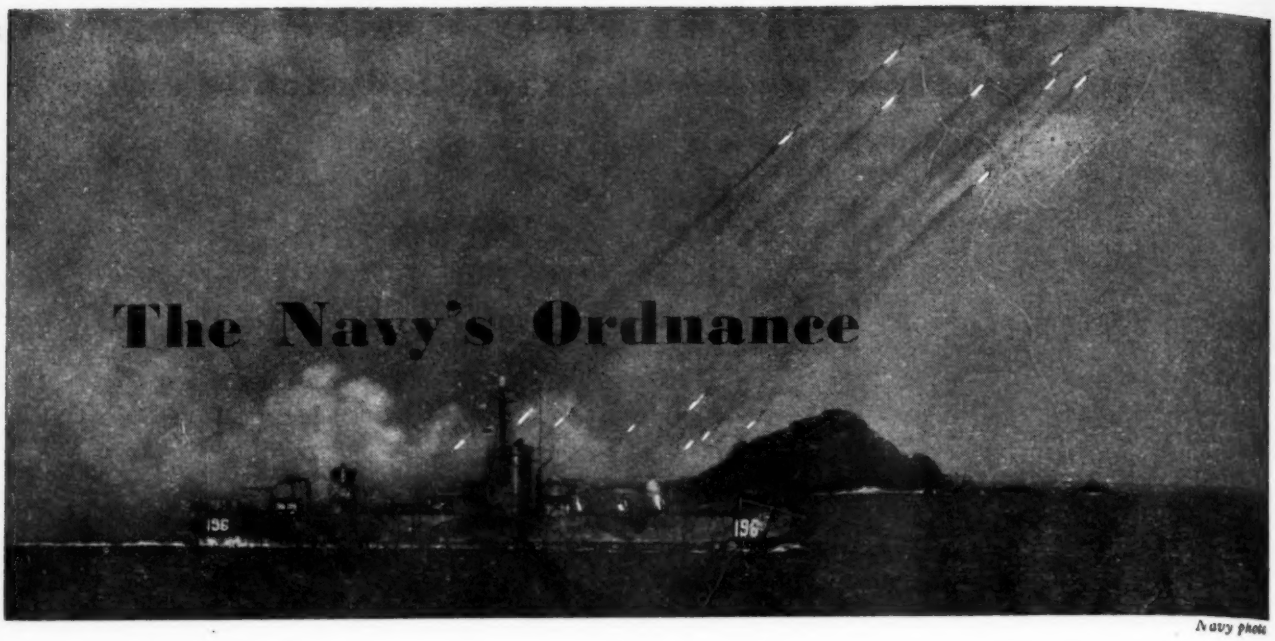
Some indication of the range of fundamental research necessary may be had from the fact that we currently hold 226 basic research contracts with 57 leading educational and nonprofit scientific institutions throughout the United States. Our upper-air research program has mathematicians at work checking experimental data and developing computing machines.

The "human engineering" phase of high-speed flight is of the utmost basic importance. We are conducting exhaustive physiological, biophysical, and psychological studies and tests to determine man's limitations with the objective of providing means to overcome them.

Reliance on Industry

In addition to recourse to outside scientific research, our work is very closely coördinated with related activities of the Army and Navy. As always, engineeringwise, we look with reliance to industry and its stockpile of experience in aërodynamics, structures, power plants, automatic controls, instruments, and many types of electronic equipment.

We of the Air Force have long been bolstered by the aggressiveness of the A.O.A. membership which, since 1919, has been "pledged to industrial preparedness for war as our Nation's strongest guaranty of peace." We in the Air Force heartily endorse this pledge.



Navy photo

Men, Money, Materials, and Time Are the Problems

by

Rear Adm. Albert G. Noble

"We must install in our vessels the advances made in science and the developments which have reached us through production."

IN the manufacture of weapons and equipment, the fields of endeavor of the Navy Bureau of Ordnance and Army Ordnance Department are very clearly defined. We act to complement each other. In doing that, the Bureau's contribution to Army Ordnance is not measurably as great, but our spirit and our willingness to contribute are.

On the Army Ordnance side of the picture, they furnish us with all the munitions—that is, weapons, equipment, and combat vehicles—we require to outfit the Navy's ground forces—the Marine Corps. They also furnish bombs for our Navy aircraft.

Upon occasion we furnish things the Army needs. For example, we furnished the mines which were used in the strategic warfare against the Japanese Empire. There is little, if any, duplication of effort; if there is, there is a reason for it.

We are indebted to Army Ordnance, we are indebted to the Army Ordnance Association, and we are always happy to be included in the party where Army Ordnance and the Army Ordnance Association are present.

I was asked to give briefly what the Bureau of Ordnance has in hand and in which direction we are heading; but before I do that, I would like to recount briefly the experience of the Bureau of Ordnance and industry in World War I.

According to our way of thinking, the largest contribution made in the interest of standardization in World War I was a widespread acceptance of specifications for material. Previously, the manufacturer was largely in the hands of the supplier to furnish him with standard articles of what the supplier thought was wanted, but with the introduction of specifications, the industry was able to get the specific items and articles it needed.

During World War II, widespread acceptance and adoption of special tools, jigs, fixtures, and manufacturing aids gave us identical items in quantity production.

Late in the war another aid for manufacture was originated which, for lack of a better name, was called "quality control." The Bureau of Ordnance, under the inspiration, I think, of Bell Laboratories and certainly benefiting by the experience of the Johns-Manville Corporation, has progressed rather far in that respect.

Quality Control

During the war, the Bureau of Ordnance established a quality-control program which has paid dividends and is continuing to do so. In our case, the term "quality control" refers to the application of basic statistical principles in slightly varied forms to our three basic quality problems.

For inspection of newly acquired material, we are using "Standard Sampling Inspection" tables. At our own plants we are introducing machine control charts with resultant improvement in quality and reduced scrap and rework. At the laboratories, when required for the surveillance inspection of fuzes and the other unstable components of explosive ordnance, quality control keeps costs down by establishing minimum adequate sampling techniques.

In one field alone where we have introduced machine control charts we anticipate that our savings in rejects—or failures to pass inspection of one nature or another—will average eighty per cent of our total previous rejects.

At the present time our effort is spread in three fields. One is to recondition and place in storage with preservatives the equipment we used in the past war which is considered suitable for use if there should be a war within the near future.

All the materials we used during the war were divided into three classes: (1) that which is reasonably modern, (2) that which is on the obsolescent side, and (3) that which is not satisfactory for use.

Within the limitation of funds made available, we have saved all the material in the first class. We are now trying to save all the material in the second group. The material in the third class is largely being discarded.

Maintenance and Repair

The next field of our endeavor is in the maintenance and repair of our existing forces. The Navy, as you know, is subject to call on short notice and can be sent into any open waterway that is not within the boundaries of a country without creating an international incident.

For that reason it has been possible to project our force in far-distant theaters and make its presence known. It undoubtedly has had influence on some very great problems, and in order that that force may, in effect, be strong we not only have to keep it in condition to perform its duties, but we must do so with the funds available.

Rear Adm. Albert G. Noble, new Chief of the Navy's Bureau of Ordnance, delivered this address at the Ordnance Clinic during the first session of Twenty-ninth Annual Meeting of the A.O.A., held at the Waldorf-Astoria, New York City, on October 1, 1947.

We must install in our vessels the advances made in science and the developments which have reached us through production. For example, if we have a new type of antiaircraft gun which is more efficient than the kind now installed, it is necessary that we install it.

I don't think any of us should lose sight of the fact that the advancement in the aircraft industry with regard to speed has been so tremendous that as short a time as ten years ago it was past our realm of conception that we would be confronted with aircraft having speeds in excess of 660 knots an hour.

We will be faced in the not-too-distant future with greater aircraft speeds. Even now we have aircraft which are trying to pierce the sonic zone. Whether or not they will be efficient in warfare immediately is open to question. With the engineers working on the problem, we all feel confident it will be just a matter of time.

In the past war we were confronted with Japanese aircraft of relatively low speed but high maneuverability. Through artifice they were able to come within the area in which the fleet operated—inside the screens of the smaller ships. I think that problem is behind us because new aircraft will have such high speeds that I don't believe they will have maneuverability.

However, they add another problem in that they can fire from considerable distance weapons which did not exist until the very latter part of the war.

Antiaircraft accuracy must be greatly improved, and the ranges of our guns must be lengthened. Therefore, we are confronted with remodeling the weapons we have so that they can hit targets at the longer ranges, and we also have the problem of introducing new weapons that can shoot even farther. Those are short-term problems.

Guided Missiles

In the long-range field, we also have an interest in guided missiles which we expect to develop in the not-too-distant future. How long it will take to adapt them to warfare I don't know. I would welcome a very excellent guess which I could now know would be correct because we are confronted with having to decide where to divide our money and effort and what emphasis we shall put on the short-range programs.

If we know that guided missiles will not be introduced into actual warfare for a period of fifteen years, then we can adjust ourselves to meet that condition. Every day we are confronted with statements of anticipation that guided missiles are just around the corner. They *are* just around the corner—but how far is it from here to the corner?

The Army Ordnance Association officials were kind enough to ask me to tell you what problems, if any, we have. First, I want to state that I have been in my present capacity as Chief of the Bureau of Ordnance for only twenty-seven days. I relieved an officer who is a gentleman of the highest quality and who is recognized as one of the foremost authorities in gunnery in the United States Navy. First as Production Officer of the Bureau and later as its Assistant Chief, then for nearly four years as Chief of the Bureau, Admiral Hussey turned in such a splendid performance that asking me what I find wrong or where I need help can only be related to four major things, none of which he is responsible for.

My first problem is money. My second problem is men. My third problem is material. And my fourth problem is time.

New Metals Needed

I will not be facetious and ask for a solution to those problems because I know it would not be reasonable to expect that. But we do need assistance. In our search for materials to use in guns, we need a tremendous advance in metallurgy. We need materials which will be more corrosion resistant, which will have increased strength, and which will merit our practically doubling the present initial velocity of guns now in use. We need metals with improved magnetic qualities—steel as well as other metals—which have previously been considered relatively nonmagnetic. We would welcome any contribution that the members of the A. O. A. could make for us in that field.

Our problems, which I have stated very briefly, are not insurmountable. We expect to overcome them. The only handicap I see at present is whether or not we will have enough money to accomplish our goals in the time allotted.

The Divisions Report

Liaison with the Services for Greater Preparedness

DURING the Twenty-ninth Annual Meeting of the Army Ordnance Association at the Waldorf-Astoria in New York City on October 1, 1947, the chairmen of the Association's national Activities Divisions discussed the progress of their respective groups. Published below are their reports on the following Divisions: Artillery; Fire Control Instrument; Small Arms and Small Arms Ammunition; Gage Industry; Rocket, Bomb, and Artillery Ammunition; and also the report of the Machine Tool Committee.

Artillery

Mr. Trainer, vice-president of the Firestone Tire & Rubber Company, Akron, Ohio, is chairman of the Artillery Division, Army Ordnance Association.

J. E. Trainer

THE principal problem of your Artillery Division Committee has been that of determining just how we could work best with the various divisions of the Ordnance Department and make our efforts felt. We didn't want to be busy just for the sake of being busy. With this in mind, a meeting of the committee was recently held at Watervliet Arsenal.

In the discussions which took place it was decided that one of the ways in which we can assist the Ordnance Department is to analyze various artillery projects, then recommend to the arsenals the companies which we believe are best fitted to undertake production studies of the items in question.

Realizing that there will be no large peacetime production orders, it is the opinion of the committee that after new items of artillery are developed and tested by the arsenals, production studies should be made of them in as much detail as possible. Then, if the need for them in large quantities ever arises, there will be a plan whereby they can be produced rapidly and efficiently.

Plan Should Be Ready

It seems to us that this is one of the things which must be done if we are going to be prepared for the possibility of another conflict. While it is unlikely that any two manufacturers will do a given job in the same manner, it is a fact that if a plan has already been worked out it will be of great assistance in expediting the production of the item.

Production studies should include layout of plant and standard machine-tool equipment with suggestions for alternate special tool equipment to give the ultimate result desired. In addition to showing this basic information, the study can be expanded to take in jigs, fixtures, and tooling, including gages.

After the company selected by the Ordnance Department to make a production study has completed it, we, as a committee, will be glad to review it and offer constructive suggestions for the benefit of Ordnance.

The committee also will be prepared to review the specifications covering manufacture of artillery, particularly new items, and to assist in the establishment of tolerances and methods of inspection. We are sure that having the committee give its recommendations on tolerances and inspection procedures will be of great value to the Ordnance Department if it is ever necessary to put the items in question into production.

I need not point out that the subject of tolerances and inspection was one of the major bones of contention during the early stages of production in the last war. Some tolerances had been fixed over a period of years by people who were not concerned with mass production but only with the end product.

Work has been started by the Artillery Committee on specific problems which have been submitted by some of the arsenals. These problems have been distributed to the members of the committee and they are working directly with the arsenals, offering their best advice.

I believe that these A.O.A. committees are of great value in maintaining the contact between industry and ordnance. One of our biggest problems in the early part of the last war was getting to know the men we were dealing with. When we finally got to know each other, we cleared a lot of hurdles awfully fast.

Having this in mind, it is important that we bring the younger men in our organizations into this program so that as time goes on they will become acquainted with the younger men coming up through Ordnance. They will then be prepared to work together as members of a team and to carry the bulk of the work if and when another big job comes.

Fire Control

Mr. Hope, president of the Gilbert & Barker Manufacturing Company, Springfield, Mass., is chairman of the Fire Control Instrument Division, A.O.A.

S. C. Hope

ON behalf of the executive committee of the Fire Control Division, I would like to make a very brief report. This committee consists of Harold Sweatt, Minneapolis-Honeywell Regulator Company, Minneapolis; J. T. Mackey, Mergenthaler Linotype Company, Brooklyn; Myron Hayes of the Eastman Kodak Company, Rochester; Ralph Goetzenberger of the Brown Instrument Company, Philadelphia; F. R. Lack of the Western Electric Company, Chicago; Gordon B. Welch,

Linotone Corporation, New York; and R. E. Gillmor of the Sperry Gyroscope Company, New York.

As chairman of our Division, I want to express my personal thanks to these gentlemen for their unfailing interest and coöperation in all matters that have been placed before them. Their combined experience in the fields of design and production of fire-control matériel in time of war and allied commercial products in time of peace is second to none.

The Fire Control Instrument Division was formed two years ago when the Army Ordnance Association established national Divisions to assist the armed services with their problems incident to the design and production of ordnance. Ours is an essential element in the effective utilization of weapons on the battlefield and we are fully cognizant of the seriousness as well as the engineering novelty of the fire control instrument situation.

New Weapons

It has been our purpose from the start to view our obligation with a realistic and sensible attitude. During the past year our committee has kept in close touch with Government officials whose responsibility it is to chart the course of our new weapons development. We have been available at all times for consultation and advice. On several occasions we have seized the opportunity to assist in every possible way in answering questions that have been raised.

I personally feel that the mere presence of our committee has been of material value, both from the armed services point of view and from the standpoint of science and industry.

As an example of our committee's coöperation, Ralph Goetzenberger, who has taken the responsibility of arranging our programs, tells us of an exhibition of Army Ordnance fire-control apparatus at the Instrument Society of America recently held in Chicago to reveal to industry some of the more important fire-control problems confronting the Army and to demonstrate the similarity of design and production of related apparatus.

I cannot point to any completed projects achieved by our committee during the year. I would like to elaborate briefly on the reasons for this: I think we will all agree that there are tremendous tasks to be accomplished before our economic machine is rolling smoothly again. If the development of new weapons has not progressed to the point where the advice and counsel of the committee are required in connection with the development of these fire-control systems, it is my opinion that we should not waste the time of our members on academic considerations or on problems which may not be within the scope of the committee. We have been, and will continue to be, interested in problems of first importance.

I have kept in close contact with Army Ordnance officials and am happy to report that when they place specific problems in our hands we will be ready to undertake any assignment. The very essence of Army Ordnance Association planning is to achieve scientific and industrial preparedness. Our committee stands ready to fulfill this purpose whenever specific problems in the fire-control field are sufficiently advanced to benefit from the assistance of our committee.

I would like to compliment the armed services, and particularly the Ordnance Department of the Army, for their wisdom and breadth of vision and thank them for their realistic attitude toward the scope and functions of our committee.

Small Arms and Small Arms Ammunition

Mr. Davis, president of Remington Arms Co., Bridgeport, Conn., is chairman of the Small Arms and Small Arms Ammunition Division, A.O.A.

C. K. Davis

IN the fall of 1946, the Ordnance Department of the Army stated that it was most anxious to have the counsel and advice of the Association's Small Arms and Small Arms Ammunition Division Committee on a matter of unusual importance to the national defense. It related to the policies which should be adopted by the Department regarding the mass production of small-arms ammunition as between Government arsenals and our private industry in time of peace.

As a result of this, a meeting was held in Washington on December 3, 1946, at which time representatives of the Offices of the Under Secretary of War and the Chief of Ordnance met with our executive board for a discussion of the question.

Our reply, dated February 10, 1947, advised the executive vice-president of the Army Ordnance Association as follows:

"In a letter dated November 1, 1946, Brig. Gen. J. L. Holman, chief of the Industrial Service, Ordnance Department, Washington, D. C., advised you that a question of policy had been raised at a meeting in the War Department on October 29, 1946, relating to the future procurement of small-arms ammunition. The letter sets forth that the Under Secretary of War, the Hon. Kenneth C. Royall, stated that he would like to have the advice of representatives of industry in determining a policy to govern the placing of production orders for this type of ammunition with industrial concerns.

"In turn the Director of Service, Supply, and Procurement, Lieut. Gen. LeRoy Lutes, requested the Chief of Ordnance to submit this question to the proper members of the small-arms ammunition industry to obtain the benefit of their opinions on this matter.

"General Holman stated in his letter to you that the question to be presented might well be phrased as follows:

> 'During time of peace, should the Ordnance Department continue to place mass-production orders for standard types of small-arms ammunition at Government arsenals or should such orders be placed with commercial companies to the exclusion of Government establishments?'

"In response to your letter of November 4, 1946, on this subject, a meeting of the executive committee of the Small Arms and Small Arms Ammunition Division of the Army Ordnance Association was held at the Pentagon Building, Washington, D. C., on December 3, 1946, at which time General Holman's question was discussed by representatives of the War Department and the small-arms ammunition industry.

"The conclusions reached by representatives of the industry can be summarized as follows:

"1. Permanent Government arsenals should participate in the peacetime re-

quirements for military small-arms ammuntion. Operation of a pilot production line by the arsenal will permit continued accumulation of detailed technical information covering all phases of ammunition production under conditions simulating those of mass production. For example, a production schedule of approximately 50,000 caliber .30 M2 cartridges per day will require continuous one-shift operation of the more important machines in the pilot line. New or improved materials, machines, tools, and techniques can be proofed by extensive use at the arsenal.

"2. If and when the peacetime requirements for military small-arms ammunition exceed the pilot-line capacity of the arsenal, the remaining requirements should be produced on other pilot lines similar to that of the arsenal which should be installed in commercial plants of those organizations comprising the small-arms ammunition industry of the United States, which will be expected to expand to full-scale mass production, should the need arise. If and when peacetime requirements for small-arms military ammunition exceed the pilot-line capacity of the arsenal and the commercial plants, the Government should negotiate with commercial producers of ammunition for the activation of additional production in appropriate plants.

"3. Government arsenals are recognized as the logical facilities through which development and research on new and improved types of military ammunition should be coördinated. However, the research facilities of industry should augment and complement those of the arsenal, and the accepted results of such research should be reviewed jointly by industry and the arsenals before the details of mass production are reduced to a firm specification.

"The flow of information between Government arsenals and the industry on research and development subjects, as well as on production techniques, should be bilateral and continuous. The advantage to both parties is obvious.

"It is the opinion of the industry, based on experience gained during the last two wars, that national security, as related to availability of trained personnel, military as well as civilian, and suitable facilities translated to potential productive capacity for military small-arms ammunition, is best served by the adoption of the procedures outlined in the foregoing. These procedures will permit training of the greatest number of personnel and, should the occasion arise, will permit expansion of productive lines at the maximum possible rate.

"We believe that time will be the all-important factor should we again be engaged in war. Industry will be best prepared for such an emergency if permitted to coöperate fully with the War Department in peacetime development and production of military requirements."

The aforesaid conclusions appeared in the May-June issue of ORDNANCE magazine in an article titled "Small Arms for Security."

On May 6, 1947, we received copies of a letter dated April 30, 1947, from the Chief of Ordnance of the Army to the president of the Army Ordnance Association wherein General Hughes expressed his appreciation of the timely counsel rendered the Ordnance Department by the Small Arms and Small Arms Ammunition Division. General Hughes' letter read as follows:

"Reference is made to the letter from your office of 11 February 1947 transmitting a copy of a letter from Mr. C. K. Davis, chairman, Small Arms and Small Arms Ammunition Division Committee of Army Ordnance Association, concerning certain conclusions reached by the Industry Committee on policies governing procurement of small-arms ammunition during peacetime.

"The conclusions by this committee have been very helpful to me in reaching a decision on a policy governing procurement of ordnance supplies at Government arsenals and commercial establishments. While funds and existing statutes are controlling factors, the policy of the Ordnance Department, so far as practicable, will be patterned along the principles set forth in the industry letter.

"I trust that you will convey to the members of the committee my appreciation for their timely counsel in this very important policy matter affecting industrial preparedness."

A copy of the aforesaid letter from the Chief of Ordnance was forwarded to all committee members on May 9, 1947.

The contact headquarters and contact officials for the Small Arms and Small Arms Ammunition Division of A.O.A. were designated as follows:

Small Arms: Springfield Armory, Springfield, Mass., Col. M. K. Barroll, commanding; *Small Arms Ammunition:* Frankford Arsenal, Philadelphia, Pa., Brig. Gen. E. E. MacMorland, commanding.

As a result of the desire expressed by the Chief of Ordnance that Ordnance officers and civilian employees of the Department should not serve as members of the committees but could act as consultants to such committees, steps were taken to replace Ordnance Department members by qualified civilians from units of our industry. Copies of the latest organization chart embodying the changes have been forwarded to all members of our group.

On June 10, 1947, representatives of the industry met with the commanding general and other representatives of Frankford Arsenal at which time the capacities of pilot lines for the production of small-arms ammunition were agreed upon.

Contracts Studied

At our meeting last year, Edwin Pugsley of the Winchester Repeating Arms Company suggested that a committee be appointed to study the contractual relations between the Government and contractors during peacetime when one of the principal jobs will be research and development. This study should include a complete analysis of the present forms of contracts utilized for research and development along with an appraisal of the patent rights of the contractor thereunder.

We have followed this matter closely during the year, but up to the present writing we have not been advised that such a committee has been appointed. Therefore, we urge again that the Army Ordnance Association proceed with the immediate appointment of a committee to make the studies outlined above.

Our Small Arms Ammunition Committee has been active in a review of the description of manufacture for ball, carbine, caliber .30 M1, dated April 1946, as prepared by the Frankford Arsenal. As plans progress, it is hoped that the Ordnance Department will feel free to utilize our committees in all phases of activity as suggested in the minutes of our meeting held at the Hotel Statler in Washington, D. C., on October 2, 1946.

In closing, I wish to express my deep

appreciation to all members of the Small Arms and Small Arms Ammunition Division executive board and committees for their fine coöperation and particularly to our secretary, Col. Wallace L. Clay, upon whose shoulders has fallen the greatest burden in connection with the Division's activities.

Gage Industry

Mr. Polk, president of the Sheffield Corporation, Dayton, Ohio, is chairman of the Gage Industry Division, Army Ordnance Association.

Louis Polk

I AM happy to report that the executive committee of the Gage Industry Division of the Army Ordnance Association welcomes the responsibility of maintaining up-to-date knowledge concerning current gaging developments in any and all branches of the armed forces of our country. We invite and welcome all the committees of the Association to call upon us at any time.

Recognizing this over-all character of the committee's function and the unification of the services, our committee during the past few months has been reorganized and strengthened by adding civilian representatives and advisers from the Navy and Air Force. This will add measurably to our national preparedness. It continues our plan of maintaining contact and expanding the advantages of better understanding between the gage industry and the services concerning their varied and respective needs.

This will foster and encourage continuance of a practical program and the development of new ideas in gaging application and use in order to meet better the changing and growing requirements of the services and industry.

Recently our committee met at Frankford Arsenal by invitation of Brig. Gen. E. E. MacMorland. We are very grateful to him and members of his staff for their excellent coöperation and many courtesies. At this meeting carefully prepared papers were presented and further steps determined in dealing with gaging problems that are the result of new techniques, higher speeds, and greater firepower requirements. Among the subjects discussed were surface-roughness gaging to provide area measurement in all directions rather than measurement in a single line.

I need not elaborate too much on the relationship between surface roughness and higher speeds of aircraft, missiles, and projectiles. Further subjects discussed were Ordnance requirements for improved automatic and semiautomatic gaging devices, elimination of wear allowance on gages, and provision for modern systematizing of gage supply and control. This will help avoid duplication and excess in ordering while permitting greater and more accurate direction of already existing supplies.

Recent Developments

Recent developments have greatly altered many ideas about weapons, their types and use, as well as industrial preparedness. In turn, this has increased the critical character and need of gages.

Gaging, which controls quality and performance, now occupies a greater rôle in national defense than ever before, and it is our intent to increase the practical approach so ably promoted by the Ordnance Department in World War II.

Again, we offer our assistance, not only to shell manufacturers or gun manufacturers or aircraft manufacturers but to all the many divisions of industry and the services that must produce weapons and goods needed in time of war. Maximum tolerances, ease in assembly, required field performance, and interchangeability for parts-cannibalization remain prime requisites of gage usage by industry and the Government. Gages help to assure the meeting of those requirements.

We depend upon the advisers from the services and industry for guidance in meeting these problems. We need the coöperation of every member of the Army Ordnance Association in doing his share to keep our national production plant and our individual industries up to date in the use of newest and best gaging applications in peacetime.

As a matter of self-preservation as well as practical efficiency, we earnestly desire the closest possible efficient relationship between the gaging industry, the varied American industries that we serve, and the three great branches of our armed forces.

I want to thank every member of the Gage Committee, as well as of the Gage Division, for the fine help they have given me. It is most encouraging to have the wholehearted coöperation which is being given by industry, the Army, the Navy, and the Air Force, as we plan together to safeguard our country.

Rocket, Bomb, and Artillery Ammunition

Mr. Meek, of the Firestone Tire & Rubber Company, Akron, Ohio, is deputy chairman of the Rocket, Bomb, and Artillery Ammunition Division.

J. A. Meek

THE problem of the Rocket, Bomb, and Artillery Ammunition Division has been a little different from those presented by the other Divisions of the industrial branch of the Association inasmuch as the problems of this field have no closely allied counterpart in peacetime economy.

The very specialization of this field, requiring large production capacity in time of war, makes it essential that sound planning be done to meet emergency requirements. In order that the fund of experience accumulated during the past war could be drawn upon by Army Ordnance, H. C. Knowles, who has served not only as vice-president of the Association but also as chairman of this Division, established commodity sections with separate committees in each field. Membership on those committees has been made up of men who made outstanding contributions during the past war.

Special sections were set up covering rockets and shells, cartridge cases, powder and explosives, bombs, fuzes, containers, and ammunition loading.

The Ammunition Division of the Ordnance Department in Washington has called upon this group for advice in twenty different instances, and we thought that those here today would

be interested in the treatment of some typical questions presented.

For example, the committee was asked whether the first and second groups of plants constructed were the proper size. The group answering this question included representatives of organizations such as Atlas Powder, Du Pont, Goodrich, Fraser-Brace, Hercules Powder, Johns-Manville, Monsanto, Olin Industries, Procter & Gamble, Remington Rand, Spencer Chemical, Tennessee Eastman, Trojan Powder, and U. S. Rubber.

All those companies had an active part in the operation of these special Government-owned, contract-operated facilities. The consensus of the group was that plants should not be of extremely large size. Relatively small plants, consistent with the sources of supply and dependent upon labor conditions, offer opportunities for better management and closer supervision.

While the principle of smaller plants would necessitate more plant units and consequently more plant managements, the resultant simplification in operating problems would make it easier to obtain people of sufficient ability to operate the plants.

Specifically, the powder and explosives people felt that the maximum size should not in any event exceed a labor requirement of 7,500 employees, while the loading-plant people recommended that best results could be obtained from plants that could be staffed with three to five thousand. In terms of production units, this would be about six lines for powder and explosives, and the number of lines in loading plants would have to be determined after a decision had been reached as to the degree of integration desired.

Still another question that was advanced by Washington was, "Is the system of allocation to the districts a proper and quick method of the assignment of metal parts, and if not so considered, what is a preferable method?"

That problem was outside the range of the plant operators and dealt more with the district procurement problem. For that reason it was referred to Frank B. Bell, C. Jared Ingersoll, and John Slezak, who did such an outstanding job in operation of district offices. They felt that while the system did entail some problems, it was superior to any other plan that had been developed.

The availability of the men on these committees for advisory purposes should be of considerable assistance to the Ordnance Ammunition Division in meeting the problems which come to it from day to day. While these men are not so situated, for the most part, that they can keep up to date on every technical problem of artillery ammunition design and use, they do represent a tremendous reservoir of actual manufacturing experience which is available at all times to help solve the problem of how to get the most high-quality goods produced at the minimum cost.

Machine Tool Committee

Mr. Tangeman, vice-president of the Cincinnati Milling Machine Company, Cincinnati, Ohio, is chairman of the Machine Tool Committee, A.O.A.

W. W. Tangeman

EVERY one now knows just how essential machine tools are to the production of most types of war matériel. All during World War II there was a continuing struggle to get enough machines, to get machines of the right kind, and to get them in time for the tremendous job in hand. During this period the production of machine tools in the United States rose in 1942 to a peak equal to six times the best prewar year. Every one of over 200 companies in the industry, producing hundreds of types of machines, played an important part in supplying the vast needs of the services.

The individual members of our Machine Tool Committee had a great deal to do with solving the machine-tool problem. Some were full-time workers in Government service and others served on committees dealing with the problems of supply and allocation. Some of them worked through the period of the 'thirties with the Ordnance Department and with the other services on their farsighted programs of modernization and educational orders.

As we go on from World War II, public sentiment, public concern, and public willingness to spend money for adequate defense facilities are likely to decline. With this in mind, the members of this committee and all other committees of the machine-tool industry have energetically supported the services in their efforts to create and maintain an adequate strategic reserve of both standard and special machine tools from Government surplus purchased in the last war.

Congress happily has endorsed this idea and the tools are now being selected.

Early in the year the Ordnance Department asked the committee to recommend a policy to be followed with regard to the selling or leasing of machine tools to commercial concerns from the war reserve. The committee, stressing the need for a machine-tool reserve to be drawn upon in the early months of any possible future emergency, recommended against the procedure. They felt that nothing should be done which would have the effect of scattering or dissipating the tools selected for storage against some possible future emergency need.

If, however, requirements arose for machines which could not be obtained from qualified suppliers in a reasonable length of time, opportunity should be provided for taking machines from the reserve if replacements were ordered.

The Machine Tool Committee is anxious to be of real service to the Ordnance Department in the future. Machine tools are fundamental in the production of war matériel. We will never be fully prepared machine tool-wise for an emergency. In the future there may not be time for the necessary expansion of our industry. We have been protected in the last two wars by the needs of foreign countries which built up our own machine-tool capacity before we needed it ourselves. Possibly the next one will not give us this advantage.

In England recently I saw a machine being built for the production of a very complicated rotor for a new jet engine. This particular unit had been in process of construction for a year and a half and was not yet finished. This gives some idea of the time factor involved. Possibly, as the service departments progress in the development of new weapons and new items of matériel, whatever they may be, the machine-tool industry, through this committee or through others, can be of help by studying the specific production problems as they arise.

Standardize!

The Need for Interchangeability and Simplification

by
Donald Armstrong

"What good will it do to have a unified Army, Navy, and Air Force if downstairs in the cellar the Ordnance Department, Signal Corps, and all the rest of the service branches make their own drawings and specifications, each different from the other and all varying from common industrial practice?"

WE have heard much about universal military training. The counterpart in which the Army Ordnance Association and its members are engaged is just as essential. As a matter of fact, by it the Army Ordnance Association and its committees have established an example that may well be followed by other industrial groups. It might be called "universal industrial training," and I congratulate the Association on the progress that has already been made along this line.

General Armstrong, executive vice-president of U. S. Pipe and Foundry Company, Burlington, N. J., is chairman of the Public Relations Committee of the Army Ordnance Association. Before his retirement from the Army, General Armstrong was commandant of the Army Industrial College. Later he was vice-president of American Standards Association.

These remarks were given during the Industrial Preparedness Luncheon of the Twenty-ninth Annual Meeting of the A.O.A. at the Waldorf-Astoria, New York City, October 1, 1947.

Art of Execution

Napoleon once said that war is an art only of execution. In so far as this dictum omits the importance of planning, it is obviously an exaggeration. Nevertheless, action is as necessary today as planning, and it is in the work of the components of the Army Ordnance Association that we see such action exemplified.

The recent unification of the Army, Navy, and Air Forces, the Munitions Board and all other top agencies, provides the final planning that must prepare for a possible aggressor. The reports of the Association's Technical Divisions showed how well this top-flight planning is being implemented.

I am now speaking from a personal experience of fourteen months since I retired from the Army. I have been working with industry, and I have discovered something of the inertia, indifference, and ignorance with which some of the basic elements of industrial preparedness are regarded. Considering standards and standardization, for example, what good do you think it will do to have a unified Army, Navy, and Air Force if downstairs in the cellar the Ordnance Department, Signal Corps, and all the rest of the service branches make their own drawings and specifications each different from the other and all varying from common industrial practice? That is the kind of basic and fundamental thinking that is needed to increase interchangeability and simplification.

Standardization Needed

I wish I could go more into detail, but we have already heard about tolerances and cylindrical fits, surface finishes and many of the basic elements of manufacturing. I would like to point out that unless there is a strong standardization movement in this country, supported and participated in by all members of the Army Ordnance Association, we will be missing one of the basic elements to accomplish the art of execution.

IT is my very great privilege and pleasure to extend to all of you on behalf of the nearly 3,000 members and officers of the New York Post its greetings and welcome as cohosts and cosponsors of this meeting.

I would like to make one statement which I believe is of great importance, and which is my personal creed in this matter. You have heard many businessmen and military men called "warmongers," and, unfortunately, you hear it increasingly these days. The same name has been and will be applied to many members of the Association and military men.

We all know that this is not so. I don't know of any businessman or military man who understands our great basic economy and social problems of today—and, believe me, they have to understand them or they would not be where they are—who wants war. They all want peace. But they don't want peace at any price!

They understand the basic necessity of preparedness and production of what is necessary for preparedness. There are two problems—tremendous ones. They believe, like Dr. C. H. Van Tyne, a former head of the History Department of the University of Michigan, that "There will never be universal peace until the greatest and best prepared military force is controlled by the most peace-loving nation." Think that over!

So, to those who call us "warmongers" and other names, let us deny that charge with the most sincere conviction, and let us preach to all the gospel of peace through preparedness.—H. M. TILLINGHAST, *president, New York Post, Army Ordnance Association, at the Twenty-ninth Annual Meeting.*

Security through Planning

Our Strength Is the Cornerstone of International Unity

Thomas J. Hargrave

YOU have chosen a wonderful theme for your 1947 session—"National Security Now." National security now, through a strong America, means a quest for peace.

Nearly every person in this country hates war. Members of the Army Ordnance Association, I know, hate war. The Munitions Board hates war. If I did not think so, I would not be a member of your Association nor Chairman of the Munitions Board.

But being prepared for war and waging a war are two different things. Unpreparedness did not keep us out of World War I nor out of World War II. In fact, documentary evidence proves beyond controversy that our lack of preparedness constituted an invitation to nations bent on aggression to attack us. Consequently, preparedness is essential to peace.

Although urging preparedness, I must continue to believe the only real hope for a lasting peace lies in the abolition of war through friendly arbitration among nations. The United Nations is our hope for that achievement of peace to which our country has wholeheartedly dedicated itself. We all must be devoted to its principles and purposes—"to save succeeding generations from the scourge of war, to reaffirm our faith in the fundamental rights, and to unite our strength and maintain international unity."

Cornerstone of Success

Our being ready and our being strong is the cornerstone for the success of that noble venture. Our being unprepared will not breed confidence in the other nations who share our democratic ideals and who are wishing for world peace.

Wishing in itself will not bring world peace. We must have strength which we can translate into both the willingness and the determination to make world peace a lasting fact.

There are many phases of preparedness—diplomatic, military, industrial, and civilian. I will discuss briefly here the things the Munitions Board is doing in connection with industrial preparedness. Fortunately, I need not tell this gathering of the importance of industrial mobilization nor of our production achievements in the last war.

You gentlemen, I know from my work with the Army Ordnance Association during the war, are chiefly interested in end products. As Chairman of the Munitions Board, I am interested in the planning for end products.

"Munitions Board," in a sense, is a misnomer for the Board does not deal directly in munitions. The Munitions Board is primarily a planning board, and I would like to familiarize you with some of the things it is working on.

New Organization

To begin, I would like to refresh your recollection of the organization recently established by the National Security Act of 1947. The National Security Organization is headed by the President. Directly under him are the National Security Council, the National Security Resources Board, and the Secretary of Defense.

Under the Secretary of Defense there are four joint groups: the War Council, Joint Chiefs of Staff, the Research and Development Board, and the Munitions Board. Also under him are the three departments of Army, Navy, and Air Force.

That will give you a quick glimpse of where the Munitions Board fits into the picture. The Board reports directly to the Secretary of Defense. It is comprised of a chairman and the Under Secretary or Assistant Secretary of each of the three services—Army, Navy, and Air Force.

In addition to the Board members, we have an executive committee consisting of myself as chairman, a general from the Army, an admiral from the Navy, and a general from the Air Force.

Four Divisions

The activities of the Munitions Board are now divided into four divisions, not counting administration. Through the activities of the Procurement Division we are striving to coördinate all military procurement in a manner that will increase economy and efficiency. We are interested in joint specifications and in uniform standards, cataloguing, contracts, and inspection, to mention only a few of the objectives.

One of the principal responsibilities of the Munitions Board is the assignment for single-service procurement of common-use items; or, if not single-service, then joint-service procurement.

To date, we have made quite a few

Mr. Hargrave, president of Eastman Kodak Company, Rochester, N. Y., and Chairman of the National Defense Establishment's Munitions Board, delivered this address at the Industrial Preparedness Luncheon, Twenty-ninth Annual Meeting, A.O.A., at the Waldorf-Astoria, New York, on October 1, 1947.

such assignments. For instance, subsistence is procured (for all the services) by the Army, coal by the Navy, lumber by the Army, and so forth. After such an assignment, you can know with which service you will deal on a specific item and that a particular service will deal with industry for all service requirements on a specific item. I know we are going a lot further in this field.

The Munitions Board's Materials Division has a great many functions, such as making surveys of materials. Its principal job, however, is concerned with the administration of the Stock Piling Act—Public Law 520, Seventy-ninth Congress—a law conceived with great intelligence.

While in this century we have gone through two world wars, fortunately we have had about two years in each one in which to acquire the strategic and critical materials needed for production of the goods for war. It is not likely we will ever again have that much time in an emergency.

There are approximately 50 strategic materials which cannot be found in any substantial quantity in the United States and which must be imported from sources anywhere from 3,000 to 10,000 miles away. In an emergency, without open shipping lanes, we could not hope to get into this country sufficient quantities of these materials with which to wage a major war.

Stock-piling Law

The stock-piling law provides the way to acquire what strategic materials may be necessary in the event of another war. This is what has been done. A list of critical materials, essential and often in short supply during the last war, was prepared. These materials come from remote parts of the world—India, China, Russia, Africa, and other places in the Eastern Hemisphere. We have already acquired a considerable amount of them, and we have had appropriations for that purpose totaling $275,000,000.

The stockpiling program as projected has an estimated cost of about two and a half billion dollars. In these days of economy that is big money. However, such an expenditure is one of the best investments the Government could make. In the first place, if war should come, we will be ready; if war should not come, we will still have the materials which I feel certain we could dispose of without any substantial loss.

"Wishing in itself will not bring world peace. We must have strength which we can translate into both the willingness and the determination to make world peace a lasting fact."

Another division of the Board is the Products Division, which is largely concerned with facilities and machinery. This division has made many surveys of plants and equipment.

During the war, the Government built some 1,200 plants which cost about 14 billion dollars and spent about 4 billion dollars in expanding other plants and facilities. It is now probable that the Government will eventually retain about 125 of such plants and may sell about 175 under the National Security Clause. That will not give the Nation everything it needs in an emergency, but certainly it will give us a bigger start than we had before.

Products Division

The Products Division is also concerned with the allocation of plants and facilities. One of the services, for instance, may request that one of your plants be assigned to it for a certain type of production. If the Munitions Board approves, that service will approach you. If you are willing, a representative of that particular service will come to your plant, discuss the matter, and look over your facilities and tools. If you come to a mutual arrangement, then should an emergency occur that particular plant will be used by that particular service for a particular production purpose.

The fourth division of the Board is what we call the Services Division. It is concerned with economic controls planning.

Accumulatively, the Munitions Board is endeavoring to prepare a satisfactory plan of national industrial mobilization. An edition, or revision, of such a plan, keeping it up to date, will be prepared annually. The 1947 plan should be ready within a few months but will be extremely tentative. Selected representatives of industry, labor, and government will be asked to study and criticize it with the idea of improving it to the greatest possible extent. It will be marked "Tentative" and "Restricted."

This is the first such plan the new Board will have issued, and we are marking it that way because we have not had the opportunity to submit it to enough groups of people—particularly in labor and in industry. If such a plan is to work, it must have the general acceptance of all segments of our people.

Unfortunately, you cannot get 500 persons into a room and formulate a plan. You first have to get something down in writing to "shoot at," and that is what we are doing now.

Itch for Criticism

Personally, I think this nearly completed plan is quite good, but it certainly can be improved, and it will be. It has been approved by a considerable number of individuals, but I assure you that you can hardly find any one who will not find some fault with it. That is what we want. We practically itch for criticism, and when the ballots are all in we should have a plan democratically arrived at that will be both acceptable and protective.

The minute we get the 1947 plan out, we are going to start on the 1948 plan.

In connection with the 1947 plan we will have a manual of an Office of War Production. Subsequent plans will contain manuals for an Office of War Manpower, Office of Economic Stabilization, and other control agencies such as transportation, communications, shipping, and so forth.

We want to be prepared, and we, who are charged with the responsibility of preparedness, want you of this Association and other similar groups to be fully informed. With such an approach, we hope that if an emergency should ever again arise our efforts will at that time generate more light than heat—that we will have an informed Nation ready to implement the U. S. Industrial Mobilization Plan.

Again, I must say to you, we are preparing not for war but, if humanly possible, to prevent war.

The functions and activities of the Munitions Board were described in some detail in an article which appeared on page 153 of the November 1947 issue of ORDNANCE.—THE EDITORS.

America's responsibility

Power for Peace

Our Preparedness Is the Only Challenge to Aggressors

The Survival of Freedom Rests upon The Armed Forces of the United States

by

George Fielding Eliot

"It is upon the weight which others attach to the actual striking power of the United States that the decisions of peace and war may depend."

I WAS particularly happy at having the opportunity of addressing the Army Ordnance Association, of which I have long been a member, because it seems to me you form the necessary connecting link, or one of several connecting links, between the two parts of our national security establishment: the fighting part and the supply part.

I remember once, when I was a Reserve officer at Fort Leavenworth, hearing General Johnson Hagood say you have to have two kinds of minds to fight a war—the soldier mind and the grocer mind. Perhaps that could have been put more kindly, but there is no question but that you do have to have the soldier mind and the industrial mind—the building and producing mind—and you have to have a very close connection between them.

Field Marshal Lord Wilson, who was commander in chief in the Mediterranean during the last war, remarked apropos of Rommel's failure in Egypt that more failures in war were attributable to one cause than any other he could think of, and that was trying to carry on offensive operations at the end of a long and insecure line of communications. I think you have to recall the state of the world in which we live to see the application of the Field Marshal's remark to the present situation of the United States.

Peace or War?

The preceding speakers have said that the American people do not want a war. I think that is true. If there is not going to be a war in this world, for some time to come it will be due to the deterrent power of the armed forces of this country. Therefore, it is upon the weight which others attach to the actual striking power of the United States that the decisions of peace and war may depend.

If they conclude that our striking power consists only of weapons and munitions actually in the hands of the armed forces and that when these are exhausted there will be no source of steady supply to maintain that continuity of effort which is the key to success in all military operations, then the character of the risk presented is a very different one from the risk presented if the armed forces are closely integrated with the sources of supply for the incredibly complicated mechanisms and munitions of modern war.

That is why I think that the Army Ordnance Association should count itself an essential element in the integration of our national security.

The Soviet Union

The decisions that may make for peace or war, to bring the matter down to a more concrete level, are quite likely to take place in the minds of the rulers of the Soviet Union. I am not saying that they want a war. That is what they accuse people in this country of saying or desiring.

Our objective in world affairs is, of course, peace—a peaceful world, the one world, the coöperative world we thought we were arranging when we tried to charter the United Nations. But to attain that, the immediate objective is to bring about a condition of affairs in which fruitful coöperation between the Western world and the Soviet Union becomes possible.

That was the great design of Franklin D. Roosevelt. He hoped that at the end of a war in which we had been closely associated as military allies with the Russians, that condition of affairs might develop.

It did not develop as we all know, or at least it has not developed yet. And I doubt very much whether it can develop until the conditions in which power is held within the Soviet Union itself have undergone considerable alterations.

I think that will come about only as a gradual process; and since such changes will be extremely distasteful to the men who now hold the power—the very small group which rules the Soviet Union—there will always be the temptation at any time during that process to seek the solution of going to war.

Risk versus Gain

In any operation of war it is a question of weighing risk against advan-

GEORGE FIELDING ELIOT

Major Eliot, internationally known military analyst and commentator, delivered this address at the Industrial Preparedness Luncheon, during the annual meeting of the Army Ordnance Association in New York City on October 1, 1947.

tage, whether it be a decision to be made by a corporal leading a squad or whether it be a decision to be made by the joint chiefs of staff of a great nation. So the decision whether to go to war at all or not is just a question of weighing the risk against the advantage: "What are we going to get out of this as against the risks that we assume?"

Napoleon made such decisions, and so did Hitler. Such decisions may have to be made—or at least considered—by people who have long held power in Russia as they see this power crumbling away bit by bit under the application of external pressures from a western world which inherently is infinitely stronger than they are.

Hitler is known to have calculated that he possessed a temporary advantage in his degree of preparation which would diminish quite rapidly if he were not able to use it to obtain a decision while he had it. An appeal to arms by those who hold the power to make the decisions of peace and war is always possible if the cost is not prohibitive.

Effect of Preparedness

To overwhelm in a surprise attack the first-line armed forces and crucial positions of a country which is not immediately equipped or prepared to make a counterattack that will carry through to a decision is one kind of risk. But to make an attack upon a country possessing the technical, industrial, and material resources of the United States—if those resources are so organized that they can be used in a continuous and wholly destructive countereffort—is a very different kind of risk.

The balanced organization which we now have for the national security constitutes a step in the right direction. It forecasts that other steps in that direction will be taken in which all of us bear a very grave share of responsibility.

The history of the United States bears witness that after a war there is a gradual tapering off of the public interest in matters affecting the national defense. For a year or two some things are done that look pretty good; then the appropriations are cut down and there is a pressure for reduction of taxes; then a rise of interest in other matters; and gradually the military strength that came out of the war withers away, substitutes are sought, and reductions are made here and there.

Power for peace demands modern equipment in quantity.

The armed services are told that they can get along with this or that and they can "make do." There is no more "make do" in a world in which there exist weapons such as are now available to the major nations. There is just what you have now and your ability to keep on supporting and expanding it until you have won.

The Road to War

Make do, get along—the idea that we will still have a margin of time in which to correct the errors and neglects of a comfortable peace—these are the certain road to national destruction. It is also the road to war, for it is exactly those neglects and those shortcomings which will lead others who may find in our policies a challenge to their tenure of power to take the road to war to preserve that power as against the challenge we represent—the challenge of the spread of human freedom.

These, then, are our responsibilities in the world and our risks. We are not going to abandon our responsibilities. We are not going to abandon the cause of freedom of which we are the champions. We are not going to retire again behind our ocean barriers and say that the rest of the world can get along as best it can and that the little nations threatened in their liberties will have to fend for themselves.

This is clear in all that the people of the country have said and done and in the way they have reacted to the policies now being carried out by our Government in Europe and elsewhere.

That being the case, and it being abundantly clear that through collective organization, through the United Nations, there can as yet be no element of force behind world law, behind this freedom we are seeking to support, it must be abundantly clear for the time being that the survival of freedom rests primarily upon the ability of the armed forces of the United States to support it.

Freedom will survive not only by such actions as our Navy took in the Mediterranean in 1946 and will continue to take where necessary, but by the knowledge in the hearts of those who are our opponents in this matter that it will never be safe to appeal to arms and to seek to redress the balance of power in their favor by going to war.

These are some of the reasons why I am so proud to be a member of the Army Ordnance Association and why I hope that all of you will bear in your minds and hearts a realization of the tremendous responsibility which is yours for the maintenance of peace in this world, for the security of this country, and for the future of mankind.

"Maj. George Fielding Eliot is known the world over as author, commentator, and military analyst. He was born in Brooklyn, N. Y., and educated at the University of Melbourne, Australia. He served with the Australian Imperial Forces in the Dardanelles and on the Western Front from 1914 to 1918. He was commissioned a major of the Military Intelligence Reserve in the United States Army in 1922.

"He is the author of 'If War Comes,' 'The Ramparts We Watch,' 'Bombs Bursting in Air,' and of many articles in national magazines and the daily press. His fame as a lecturer on national-defense and World Wars I and II is known wherever the English language is spoken."—C. STEWART COMEAUX, *chairman, Industrial Preparedness Luncheon.*

THE NEW A. O. A.

by
Herbert A. Gidney

Greater Efforts To Strengthen the Industry-Ordnance Team Are Planned

Colonel Gidney, vice-president of the Army Ordnance Association, and vice-president and comptroller of Gulf Oil Corporation, Pittsburgh, Pa., opened the Ordnance Round Table with these remarks during the Twenty-ninth Annual Meeting of the Association at the Waldorf-Astoria, New York City, October 1, 1947.

THE Army Ordnance Association embraces in its membership leading executives, scientists, engineers, and other leaders of industry with practical experience in successfully coping with the many complex problems of scientific and industrial preparedness in ordnance, and in constructively coöperating with the responsible officers of Ordnance and of the Army Department. It is well qualified to take a leading part in the essential mobilization of industry to keep America strong and thus lessen the threat of war.

Lessons Learned

The lessons of World War I and World War II are well known to most of the members of the A.O.A., and the officers of the Association are actively engaged in formulating plans to improve and strengthen its usefulness to the Ordnance Department and to the Ordnance districts in order to provide a practical medium for members to work closely with those in the armed services who are now and who may in the future become engaged in solving the problems of ordnance design and procurement.

A. O. A. Posts

The phases of administration and production of ordnance matériel handled largely by Ordnance districts will be aided by further strengthening the Association's Posts throughout the country. They will merit the close tie-in with the officers and their representatives of the Ordnance districts, which relationship they have enjoyed throughout the years since the districts were re-formed after World War I.

National A.O.A. officers are also working on plans to foster the success of the Posts and of the activities Divisions to hold the interest of the members and provide forums throughout the areas of the Posts in order effectively to promote "scientific and industrial preparedness for the common defense as one of our Nation's strongest guaranties of national security and peace."

To accomplish these broad objectives, the Association must be prepared to include in its thinking and service all problems which are bound to become interrelated with the several components of the armed forces under the plan of unification.

This Association is concentrating on the problems for which the Ordnance Department is responsible. It will naturally wish to be of service also to the Air Force which, throughout these years, has been included in the responsibilities of the War Department.

At the same time it is only natural that our Association should be helpful in any way that it can in rendering service in the solution of problems of naval ordnance.

Change of Name

The Committee on Aims and Organization is therefore canvassing the views of all of the Association's Posts and many of our outstanding leaders with the purpose of changing the name of the Association to "American Ordnance Association."

I am very glad to advise you that the responses received from the presidents of the Posts show that they are practically unanimously in favor of this change.

Objectives Unchanged

This proposed change of name and broadening of objectives is going through the orderly democratic process provided for in our constitution. It involves merely the change of the name. Otherwise, the present constitution covers the Association's broadened objectives fully.

The matter will formally come up before the Council at a meeting to be held after this session, and its conclusions will be submitted to the Board of Directors at its next meeting. If approved, it will then be submitted to the entire regular membership by the usual letter ballot.

This important change, however, will in no way lessen our service to the Army, Navy, and Air Force in behalf of national security now.

Military-Industrial Training

A Plan To Bring Instructors to the Reserve Officer

by

Brig. Gen. E. B. McKinley

Since the next national emergency could come without warning, the Industrial College is endeavoring to train men in industry who would be in charge of future war production.

THE student body at the Industrial College of the Armed Forces is composed of Regular officers of the Army, Navy, Air Force, and Marine Corps. We have a limited capacity and our present class is 115. At the same time, we are thoroughly aware of the fact that if an emergency should arise there will be a great need for Reserve officers of very high quality from industry and business to augment that force at the policy-making, general-staff, and control levels.

The Problem

When the subject of Reserve training was first brought up in the reconstitution of the educational system within the armed services, the Industrial College tried to figure out some way to improve our experience of the past wherein men of considerable responsibility in industry and business who held Reserve commissions found it difficult to take two weeks off to go somewhere to take laborious physical examinations and try to find places to live during the training period.

We therefore conceived the idea of taking the training to the individual so that it would disturb his normal business and personal routines as little as possible.

The thought behind it was that we are after the Reserve officer who is just behind the man who will go out of town. We want the younger man who will stay at home and run the business to permit the president to serve on a WPB or some other agency in case of an emergency. The fellow who plans to stay home is the one we are trying to reach.

Starts in January

We have had this plan approved by all the services, and we are going ahead with it. We are training a team at the school to go on the road to give this two weeks' training in the important production centers of the country. We are going to start in January and give six 2-week courses in six cities, ending in June. That will be a trial run, and, on the basis of the experience gained, we will reconstitute the plan and start out in a normal school year of ten months, giving one course of two weeks each month in a different city from September till June.

We contemplate only four hours of training a day. At present, we are thinking of having classes from ten to twelve and one to three o'clock. It has been noted that a great many business people have their most important conferences in the morning, so we are now considering the idea of repeating the ten-to-twelve period from seven to nine each evening. The instruction will be only for two 5-day weeks, Monday through Friday, and it is hoped that in that way Reserve officers can sleep in their own homes each night during the 2-week active-duty training period.

The scope of the training is going to cover in a condensed form the entire course we now give at the Industrial College. Of course, we are in the experimental stage, but our training team is now working hard trying to condense and enliven the subject matter.

General McKinley, commandant of the Industrial College of the Armed Forces, Washington, D. C., delivered these remarks at the Ordnance Round Table during the Twenty-ninth Annual Meeting of the Army Ordnance Association held at the Waldorf-Astoria, New York City, October 1, 1947.

To Train Industrialists

Following through on the idea that our next emergency may be immediate, we reason that if this training is good for a man in industry who happens to have a Reserve commission, it should be just as interesting to the man who is going to stay home in the plant and produce the munitions. Therefore, after the first day or two, which will be devoted to military subjects of interest to the Reserve officer, we propose to open this training to selected industrialists who are interested and want to attend.

We are a "traveling show." The Army areas, Naval districts, and Air Force areas which are responsible for Reserve training will have to furnish the theater, the audience, and administer the Reserve officers.

Schedule of Courses

In January we will be in New Orleans; February, Birmingham; March, San Francisco; April, New York; May, Pittsburgh; and June, Chicago. I realize that this does not cover all the industrial centers of the United States by any means, but this is an experiment. In the future, our plan is to return to the large centers annually if there are enough Reserve officers there who need the training. Smaller industrial centers will probably have the training every second or possibly every third year.

Focus on Ordnance

Education as a Means To Keep America Supplied with the Sinews of Strength

by

Clarence E. Davies

Mr. Davies delivered this address at the Ordnance Round Table during the Twenty-ninth Annual Meeting of the A.O.A. held in the Waldorf-Astoria, New York City, October 1, 1947.

Information for the general public and a program to teach ordnance procedures to young executives could best maintain enthusiasm and impetus over the inertia of the coming years.

IT is tremendously encouraging to learn that the Industrial College is going to expose men in industry to the difficult problems of ordnance organization and ordnance production. The peacetime training of industry and of Ordnance Reserve officers in these fields is not a job for the combat elements of the Army. It is a job for industrial experts, and the A.O.A. Posts can be of great usefulness in this program as well as in the over-all training program.

The prime purpose of this gathering is to discuss ways and means of making our Posts more useful, and I would like to present two suggestions for your consideration.

A Look Ahead

The aim of this Association is clear. The organization is adequate. It needs stimulus; it needs guidance; it needs leadership; and occasionally it needs what might be called a dramatic focus —an opportunity to give each of the Posts and each of those who are in charge of progress a chance to find out what has happened as well as a chance to look ahead to find out what ought to be done.

I would like to suggest that the Army Ordnance Association consecrate one day each year for a dramatic display to the industrial community and the general public of the production and organization problems of the Ordnance Department. I propose that the Army Ordnance Association adopt December 7th each year—Pearl Harbor Day—as its dramatic focal point.

Idea Not New

This is not a new idea. Many men who were active in the old New York Ordnance District can recall how, on April 6, 1923, we organized an "M-Day." In the early days of industrial planning, "M-Day" was the magic word. In the Engineering Societies Building, Ordnance officers were brought together with a representative of industry to orient each other on the problems of preparedness.

A more dramatic focus was obtained the following year when the entire facilities of the building were opened. This happened to be on a Sunday, and "M-Day" was organized by moving in desks, connecting telephones, and having officers report in uniform.

Representatives of industry came and discussed their particular problems with specialists in their fields, and afterward passed into an office set up for Judge E. H. Gary, chairman of the district advisory board, who greeted them and gave them a word of encouragement.

Those two dramatic events were very useful. They were reflected in the headlines of the newspapers. They were reflected in the increased interest and stimulus of the men in industry who came to talk with Ordnance people and went away with a sense of reality. So it is my feeling in this new enlarged program—the immediacy of which has been stressed so much—that there is an opportunity for the Posts, in conjunction with the training program and the local district offices, to provide an annual dramatic focus which will be of great value in the future when the public interest in this matter may be waning.

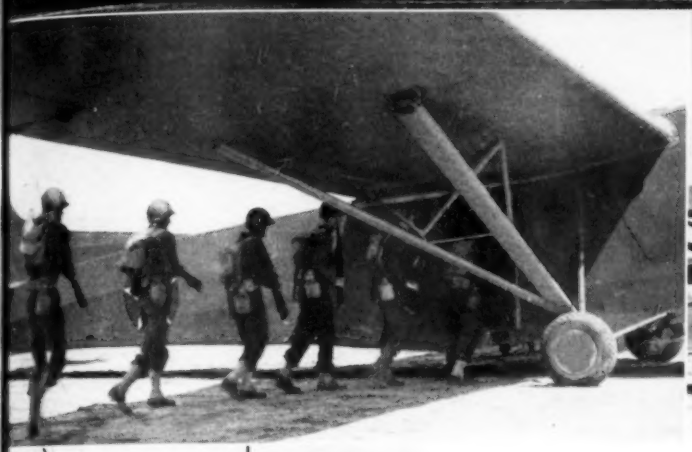
Those of us who have been active in such thinking since World War I, know how, during the late 'twenties and early 'thirties, any public discussion of preparedness against war was not well received. That situation may arise again, and it is going to take strong leadership and determined will to carry on through periods of great public inertia.

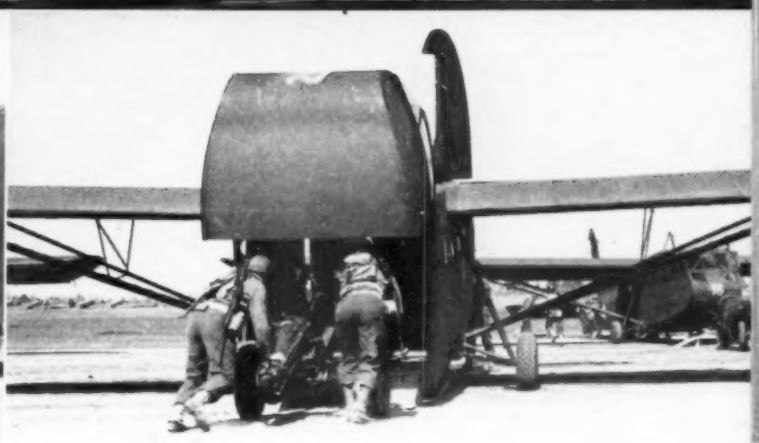
Young Men Needed

I want to make a third point. It is too bad that young men are not more adequately represented in this room, but obviously they can't be—they are the fellows that must be taught. Those of us who have had useful experience in World War II have a responsibility to see that able youngsters are given a good background of sound thinking and our best experience so that they will be better prepared when the next emergency comes.

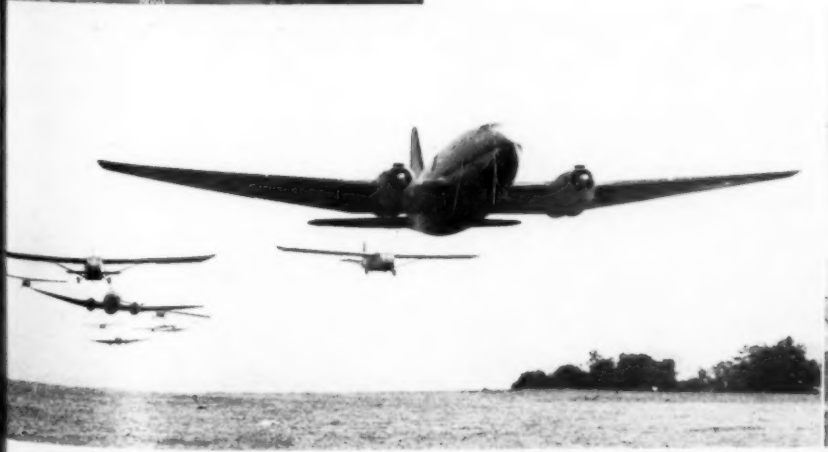
In summing up, I want to leave three challenges with you: First is the specific suggestion that the Association adopt each year unto itself December 7th as a day of self-scrutiny and a day of looking ahead; secondly, that the Posts in conjunction with other training agencies take all the steps possible to bring the young men into this problem; and thirdly, I hope the Posts will coöperate in the splendid plan of peacetime military-industrial training of Ordnance Reserve officers.

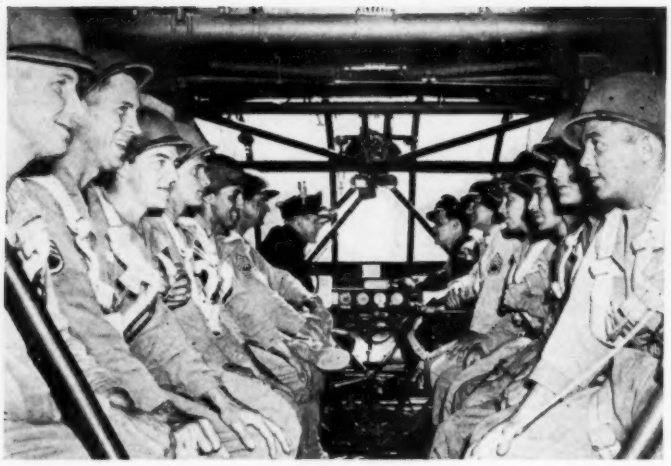
THE AIRBORNE ARMY





PARATROOPS and Airborne Infantry, now equipped with the most advanced weapons, have the fourfold mission of intercepting an enemy's initial attacks, retaliating with all possible intensity, dislodging the enemy from his advanced attacking bases, and securing territory for our forces as close as possible to the enemy's country from whence our counterattacks can be launched.





These paratroopers are being trained to jump from gliders, thereby augmenting the group transported by the tow planes.

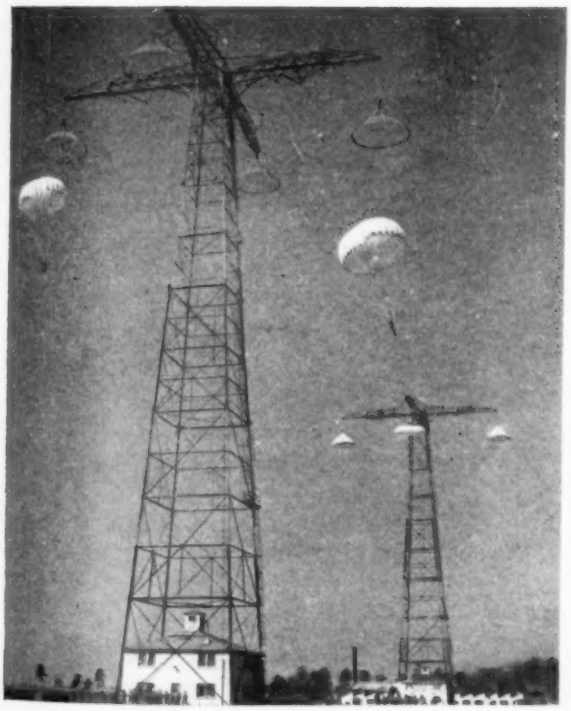
Hard-hitting Airborne troops carrying the latest infantry weapons can glide swiftly and silently to seize enemy areas.

This C-47 not only can lift the loaded CG-4A glider but can carry a cargo itself, thus greatly increasing the number of men and supplies transported to a given area.

The ground crewman above is attaching a nylon glider tow rope to a C-60 cargo plane. Left above, this CG-4A glides with hardly a sound through the dusk to land its troops in a well-hidden field. Airborne infantry, below left, moving along a road, pass gliders that landed in adjacent fields.

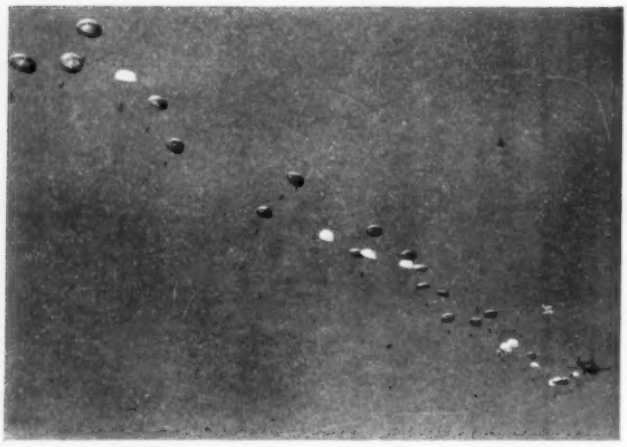
Calisthenics, above, and landing trainers, inset, are designed to harden the bodies of these trainees to meet rigid paratrooper standards.

These paratroopers, above, are boarding a transport to make their first jump from an airplane. Below, poised at the door of the plane is a trainee, showing the correct stance for jumping.



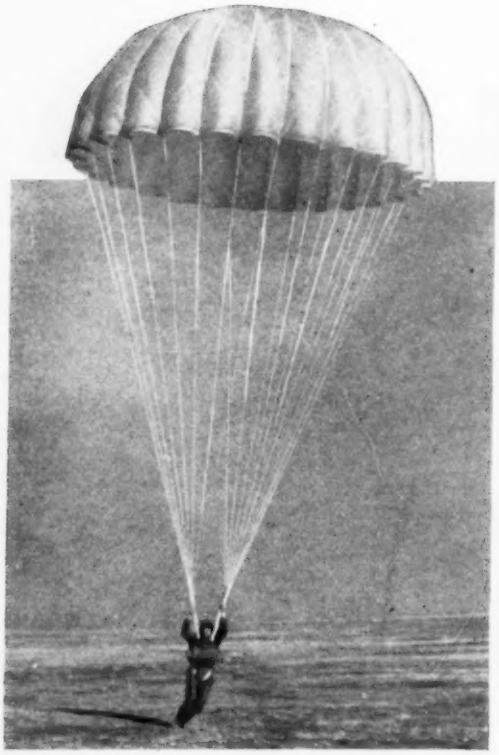
Students are released from the free-jump towers in their intermediary stage of training.

The Army's paratroops, like the Navy's Marines, are often the "first to fight." Their job is to seize strong points and potential air bases in enemy territory, establish airheads, and hold off counterattacks while reënforcements are brought up.



New, huge troop-carrier planes now permit greater numbers of troops to jump with record speed in higher concentrations.

A cloud of parachutes descends through dust and haze as the paratroopers of an airborne division make a practice jump.



A few seconds after hitting the ground, left, each paratrooper has unlimbered his weapons and forms part of a combat team like that shown above.

Blueprint for Defense

The Compton Report Outlines a Plan For a Secure and Stable World Order

by

Maj. Gen. Manton S. Eddy

"We must maintain a constant state of readiness and ability to counteract attack with the most powerful weapons. Never again will we have months after the outbreak of war in which to mobilize."

THE most complete and comprehensive plan for a national-security program, significantly enough, has not come from the military agencies of the Government. It has come instead from a group of distinguished civilian leaders appointed to a commission by the President of the United States to study this very important question.

This Commission, headed by the noted scientist, Dr. Karl Compton of the Massachusetts Institute of Technology, consists of religious leaders, leaders of education, representatives of labor, and representatives of management who studied this question and examined the problems of national security over a period of six months from an impartial and objective standpoint.

In reaching its conclusions, the members of this Commission have taken to heart all of the lessons that we have learned from World War II. They have faced the geographic, the political, and scientific facts of the present world situation. They have analyzed our economic situation and state of preparedness, and they have come up with an answer.

Preparedness for Peace

In the first place, the Commission, like all of us, hopes and prays that permanent security might some day be achieved through international cooperation in the United Nations. The Commission found, however, "that it is apparent from the experience of the postwar period that the only way in which we can lend authority to our voice in international affairs and inspire confidence in the ability of the United Nations to endorse peace is to maintain our armed forces at a level of efficiency and comprehensiveness that will defy challenge by any would-be aggressor. If the people of this country will declare in convincing fashion their determination to support such a program in all its elements as long as may be necessary to guarantee the attainment of a stable world order through the United Nations, they will make the greatest contribution to perpetual peace within their power."

In its deliberations of the probable nature of any future war, the Commission found that we are not only subject to sudden attack by high-speed, long-range aircraft across the polar cap, but that we also will be subject to attack by atomic energy and effects of bacteriological warfare.

Now that we can expect widespread fifth-column activities and when every city, town, farm, and every segment of the population would be in physical contact with the war, the Commission states that to meet such a sudden violent attack we must maintain a constant condition of readiness and ability to counteract attack with the most powerful weapons. Never again will we have months after the outbreak of war in which to mobilize.

Bear in mind that this is not the voice of jingoistic soldiers, or chauvinistic saber rattlers; it is the statement of a representative group of citizens, influenced by their own situation and profound judgment, deeply worried about our security, with the knowledge that we must do a great deal about it if we are to avoid disaster.

In the opinion of this Commission, the only way we can avoid disaster in the first days of a total conflict is to provide two things. They state, first, that we must have an air-borne striking force composed of highly trained professional troops equipped with the most advanced weapons and maintained in a constant state of alertness.

General Eddy, who delivered this address at the Ordnance Round Table during the Twenty-ninth Annual Meeting of the A.O.A., is Director of Information, Department of the Army.

Trained Men

Second and equal in importance to this force in being, the Commission states that we must have trained men in every part of our own country ready and able to meet disorder, sabotage, and even invasion. Attack may come so swiftly and from so many directions that no standing army could assume this responsibility and still mount an offensive of any significant and effective proportions.

Our reliance at home would have to be on citizens trained in advance and so diffused throughout the Nation that some would be instantly available no matter where the need arose.

In designing a way to meet these unpleasant facts regarding the probabilities of the reoccurence of a global war on a devastating scale, the President's Commission outlined a definite program of national security.

This national-security program, as laid down by this Commission, is the most comprehensive blueprint this country has ever seen developed. It is not a simple plan. It is a complex set of measures to weld the country's many sinews of war into a powerful design to prevent any World War III and thus permit full growth of the United Nations; or, failing in this, to assure victory over any world aggressor who might launch an attack against this country.

Planned Preparedness

Strategy Should Be Geared to Our Industrial Potential

by

Hugh C. Minton

General Minton, a vice-president and manager of Koppers Company, Inc., Pittsburgh, and president of the Pittsburgh Post of the Army Ordnance Association, delivered this address during the Ordnance Round Table of the Twenty-ninth Annual Meeting of the Association held in the Waldorf-Astoria, New York City, October 1, 1947.

ALL the speakers today have emphasized the value of time in our defense planning. I got a new conception of timing the other day. I was riding in the train from Sewickley to Pittsburgh, and the conductor of the train was sitting across the aisle from me doing the sort of bookkeeping that a train conductor has to do.

We were proceeding toward Pittsburgh at a good rate when a male passenger, somewhat inebriated, approached the conductor and inquired: "Say, Mister, how far is it from Sewickley to Pittsburgh?" The conductor very courteously replied: "My friend, it is twenty miles from Sewickley to Pittsburgh."

The passenger thanked him and walked away. A few minutes later he came back again and asked the conductor: "Mister, how far is it from Pittsburgh to Sewickley?" The conductor looked up and said, not quite so courteously: "I just told you it was twenty miles from Sewickley to Pittsburgh, and if it is twenty miles from Sewickley to Pittsburgh, it has to be twenty miles from Pittsburgh to Sewickley."

The slightly inebriated passenger thought this over for a few minutes and then replied: "Not necessarily so—it is just one week from Christmas to New Year's, but it's a hell of a long time from New Year's to Christmas!"

So we just have no way of knowing how much time we have to get ready for World War III. Some of our best thinkers say it may be a matter of months or a few years, others that it may be as much as ten to twenty-five years.

The Initial Target

However, it is clear that we shall never again have two years in which to mobilize for war on a hit-or-miss basis. It is equally clear that next time our country will be the initial target of attack. The speed with which we can mobilize—industry, science, man power—may well be the determining factor between victory and defeat.

Next time we hope that strategy and tactics will be geared to our industrial potential. For the military to plan this way, our national industrial potential must be known. This national industrial potential is equal to the sum of the industrial potential of the companies making up American industry.

Out in Pittsburgh I know that several companies have given serious thought to determining their own industrial potential. I know of one company which has really started such a project.

The company to which I refer first prepared an outline of what it calls its "industrial-mobilization plan." This outline was submitted for comment to managers of each principal company activity. Many helpful suggestions were received and the outline revised.

In essence, this company's plan details present production capacity, raw materials required for maximum production, materials demand on other industries to maintain this production, and the possibility of expansion along present or related lines.

This information is being gathered, first, from the plants in the field where the operators are familiar with and sensitive to the problems posed by maximum operation. These detail plant plans are then summarized through the operating divisions until, plant by plant, activity by activity, the plan is integrated into company potential.

The organization for industrial planning starts with the plant managers who are designated as industrial-mobilization representatives for their plants. The division general managers or their production managers are the industrial-mobilization representatives for their division, the manager of the company's production department is the over-all industrial-mobilization representative, and the president is the director of industrial mobilization for the company.

Now this company expects valuable by-products from determining its own industrial potential.

No greater catastrophe could come upon us than a third World War. Preparedness can contribute immeasurably toward preventing such a war. If the industrial potential of each company making up American industry were available to the Munitions Board and to the procurement services of the Army, Navy, and Air Force, requirements could be determined and strategy and tactics formulated on a far wiser basis than ever before.

We are all busy today, but we should never be too busy to do something about national security.

Preparedness and Peace

What can local Posts do to further industrial preparedness? I suggest that the Association give serious consideration to having each member of each Post do his utmost not only to spread the gospel of industrial preparedness as our strongest guaranty of peace but also to endeavor in every way possible to influence his own company and other companies to determine their own industrial potential and thus be prepared at a moment's notice to pass this information on to the Munitions Board and the procurement services.

The A.O.A. Posts Report

Association Chapters Show Vigor and Initiative

Members stand ready and willing to give time, effort, and industrial know-how whenever these are needed by any of the ordnance departments of the armed services.

THE following reports on the activities of local Posts of the Army Ordnance Association were made at the Ordnance Round Table during the Twenty-ninth Annual Meeting at the Waldorf-Astoria, New York City, October 1, 1947.

Those making the reports were Allen J. Armstrong, president, Texasteel Company, Fort Worth, Tex., and president of the Lone Star Post of the Association; James Dreher Maitland, president, Cobusco Products, Denver, Colo., and president of the Rocky Mountain Post; William J. Meinel, president, Heintz Manufacturing Company, Philadelphia, Pa., and president of the Philadelphia Post; Robert L. Biggers, president, Fargo Division, Chrysler Corporation, Detroit, Mich., and vice-president of the Michigan Post.

Lone Star Post

Allen J. Armstrong

OURS is the "baby" Post, organized in 1944. Our job thus far has been one primarily of organization. We have, however, accomplished one or two things that might be of interest to other Post leaders.

A. J. Armstrong

Ours is a small group numerically but a large Post geographically. We extend westward to El Paso and to the east to include a part of western Oklahoma, a distance that takes two days of fast travel to cover.

Recently I examined the roster to find that we have 155 towns and cities represented and that in only 5 of them do we have more than 3 members. So our problem is the difficulty in reaching all our members and in keeping interest alive in the work before us.

We have, however, stolen a leaf from Col. Merle Davis' book by organizing chapters in the principal cities. We have now a chapter in Fort Worth that has been functioning for some months. A chapter in Dallas will be functioning next month, and one in Wichita Falls also will be inaugurated next month. We hope soon to have chapters in both El Paso and Waco. These are the only cities in the Post having more than three members.

It may be of interest to other Post leaders to know that our planning in this respect seems to have been successful in some degree. Rather than attempt to get the whole group together on any project or for discussion of any matter referred to our Post by the central organization in Washington, we simply get in touch by long-distance telephone with the leaders of the several chapters who can easily arrange for a luncheon or evening meeting of their local groups. By this means we conveniently reach a large part of our membership for a consensus on any subject.

We have also taken the initial steps to affiliate ourselves with the several Reserve-officer associations and have addressed these bodies to acquaint them with our plans, so that if there ever should be another war in prospect we would have our Post established in all matters relating to ordnance. We feel that the thinking and planning of the men that had to handle our weapons in combat will be of great value in the matter of possible improvement of these weapons.

Before I close, I wish to say something about the crying need we have in our area for industrial-military training. At present we do not have any very tangible immediate objective—we have nothing with which to hold interest. If the War Department should inaugurate classes by which our foremen and technicians could get ordnance training, it would be a grand thing and would do much to stimulate interest and to help build up our Post.

Rocky Mountain Post

James Dreher Maitland

IT seems to me that dissemination of information is the thing we are trying to accomplish. Out in the Rocky Mountain region we do not have the industrial concentration like that in the central and eastern parts of the country.

I believe that the members of the Rocky Mountain Post are thoroughly aware and perfectly willing to cooperate in any way they can on any research, development, and production work that may be presented to them. I think our problem particularly is to get before the general public the information and facts to make them understand we are doing those things that will be helpful in the event we again get into trouble internationally.

I am very much impressed by the remarks I have heard here today. I believe that we are headed in the right direction. We have come a long way. We have done a lot of research work and have accomplished a great deal. If we can get the people to understand what we are trying to do and going to do and put the problem up to them, we will go a long ways in a hurry.

Philadelphia Post

William J. Meinel

OUR industrial leaders can do a much better job on the defense program. While this is being much talked about, it is only fair to say that, in my contacts with businessmen, I find little is being done about it. You will find many plants that were equipped to do a bang-up job on ordnance completely forgetting that there ever was such a thing as ordnance in their shops. They are so busy with their peacetime requirements that they give no thought to their Government's need. They would, in consequence, not be well prepared should another emergency develop.

Most industrialists felt that they did a darned good job during the last war.

Personally, I cannot agree with them. I think entirely too much money was spent on new plants and special equipment. Had there been a more careful engineering and scientific approach, we could have manufactured what our armed forces required in shorter time and at much less expense, and you would not have the tax burden you are carrying today in consequence!

Industrialists today must realize that we must all make sacrifices. We must use some of our profits—if we have profits—to help the Government on its research and development program. In that way we can see that designs are made to fit available facilities. We cannot let our engineers and scientists develop items that are unnecessarily difficult to manufacture.

I believe that a closer tie-in between Government and industry, from that angle, could do much toward preparing our plants to respond to an emergency. Much has been said and written about research and development, but we must be practical and go beyond that point.

That leads me to another weakness in our present setup—our lack of skilled craftsmen. I can think back a few years when, in the automotive industry, they brought out new models in a period of six months. In this time they designed the cars and the tools with which to build them and had them in production within the allotted time. That was done with skilled craftsmen, many of whom had learned their skills abroad. We relied on those men. Today our engineers and scientists are making wonderful contributions, but we must still have skilled craftsmen to carry out their ideas within a reasonable time limit.

It would seem to me that this Association could do much to stimulate interest on the part of our young people along craft lines. There is a real need for practical training. This message should be gotten to our students in colleges and universities. Make them realize what is needed to make America defensively strong. More than formal education is needed—we need men with ability who are willing to roll up their sleeves and work with their hands. Their failure to do this is creating a serious situation in our factories and workshops.

Our personnel-department men interview the sons of our skilled craftsmen and sell them on a program of training that will permit them to make more money after a six weeks' course than their fathers earned after years of training. But that program does not make skilled craftsmen. We must go back a bit.

We will always require skilled labor and the services of those who take pride in their skill. Why not encourage young people to learn to become thoroughly skilled? Why just give them a little knowledge and training that will permit them to earn a wage instead of giving them a solid foundation for success?

I trust that these brief remarks might encourage this Association to take an active part in reaching out, not only among its members, but among our schools and colleges, so that young people may be trained to take our places later on.

Michigan Post

Robert L. Biggers

I CANNOT help but feel that one of the greatest things we can do with each Post of the Association is to build the structural framework of the A.O.A. so that we will have an instrument on which to base major programs of the most constructive use to the Army, to the Navy, and to the Air Force. Activity can then be coördinated and directed through the Council and through the armed forces themselves. It seems to me that that coördination of activity is particularly essential.

Robert L. Biggers

I think we have rather simple problems in the Michigan Post in comparison, for example, with some of those in the Lone Star State. We had a peak of 5,500 members. The membership is now about 4,000. The present majority, of course, is in Detroit. We began by building that Post and achieved some cohesion in it by semi-annual meetings—dinner meetings attended by 1,200 to 1,300 people. During the war years these affairs were very constructive, very well attended, and easily arranged. We had speakers of national importance—of military fame and prominence—from all branches of the service. We had General Stilwell, General Eisenhower, General Aurand, and several others. We had Adm. Marc Mitscher of Navy Task Force 58 and Lieut. Gen. Ben Chidlaw of the Air Force Air Matériel Command.

We tried to go further, as we felt there was an additional need to tie in the outlying points as well as to tie in the various groups in our own organization in Detroit.

We have tried to arrange—and up to this time we have not been too successful—technical meetings on specific subjects that would be attended by perhaps three or four hundred people.

There was one other type of meeting which we tried, and it was most successful. This was a full-scale air show—in the air and on the ground. The idea originated with Washington Post's Army Ordnance Day at Andrews Field, Md.

Through the help of the Air Force and through the outstanding coöperation of Colonel Hudnell at Selfridge Field near Detroit, we held on June 18th a "big league" air show. At first we planned for six or seven hundred people. We had 1,100 acceptances on the morning of June 18th for the picnic supper that was to be served, and, since the weather improved, our attendance increased to 5,300 people.

The Air Force put on one of the greatest shows I have ever seen with P-80 jet fighters, P-51 Mustangs, B-29's, B-17's, B-25's, and with an Air-Sea rescue squadron dropping one of their lifeboats from a B-17. Through the public address system hooked in with the pilots' radios and the control tower, the spectators felt that they were really being taken behind the scenes.

The development of interesting and effective meetings offers a challenge to any Post. I believe that national headquarters can be of great practical assistance to the individual Posts in building greater activity in all localities.

As I stated before, it seems to me that the efforts of the individual Posts should be aimed, first, at creating and maintaining an organization of such character as to provide a structure for promoting the objectives and welfare of the country and the Association in their respective localities.

The second objective should be to use this framework or instrument as a means of carrying out the coördinated objectives passed on to them by the national organization.

Saving Lives through Preparedness

The A.O.A. Has Been Striving Toward This Goal for Twenty-eight Years

James L. Walsh

President, Army Ordnance Association

IT is difficult not to be a little bit emotional on an occasion like this when, through the span of a single lifetime, one has seen an idea grow from a blank piece of paper, a pencil, and a five-dollar bill to an organization of some 40,000 scientists, engineers, and industralists. However, we must forget the past except as it points our course for the future.

The first World War cost us initially 27 billion dollars. We now know that the ultimate cost of that first World War is 100 billion dollars. We of the A.O.A. decided that everything that could be done ahead of time should be done in the event that war might come again. That is all we sought to do at first—*shorten* war.

Four Months Ahead

Perhaps we did a bit of that. Mr. Patterson, when he was Under Secretary of War, at one time said that we were four months farther along merely because of the fact that we developed certain standardized contracts, standardized letters of intent, and so forth, that enabled industry to swing into action.

But that wasn't quick enough. We didn't do a good job. The second World War came, and we lost 313,000 fine young American lives. We really lost more than those 313,000 youngsters—we lost their children and their children's children. In the course of fifty years that means we lost a million fine young Americans, so the actuaries tell me.

These remarks were delivered by Colonel Walsh during the Twenty-ninth Annual Meeting of the A.O.A. at the Waldorf-Astoria, New York City, October 1, 1947.

We Shortened the War

However, we did do something. We did shorten the war, and we did enable General MacArthur and General Eisenhower to put on successful campaigns, in every instance against superior numbers. The difference was supplied by what General Eisenhower calls "technology and machines used to save lives."

We did save lives. In fact, we have a measure of the lives we did save, because the former Chief of Staff, Gen. George C. Marshall, in his final report about two years ago, gave us a yardstick:

"As staggering as our casualties have been, the enemy forces opposing us suffered many times more heavily; 1,592,600 Germans, Italians, and Japanese were killed for the 201,367 American soldiers who died."

Adding the Navy's killed in action, we have the melancholy total of 313,000 young Americans who gave their lives for their country.

The difference was made up, not by superior men nor superior leadership—though these were splendid enough—but by the fact that our boys had the tools. American-designed and American-manufactured ordnance was the critical and controlling factor in every decisive battle of this war.

You gentlemen did that particular job. You reduced our death expectancy by eighty per cent of what it would have been if you hadn't done the job you did. But that isn't enough! I think we ought to take the position that if we are good enough to reduce battle-death expectancy by eighty per cent we are good enough to reduce it by one hundred per cent and put this country in shape so it need not fear war at all!

We have tried every other method of avoiding war—international agreements and treaties, neutrality and isolation, appeasement and stalling. None of them worked. Now, we have a pattern cut out for us by the Compton Commission, by a group of civilians who thought this thing out and wrote the program. It is not a military program, nor a naval program, nor an air program. They have told us in detail just what we ought to do to ensure peace. The Association is thoroughly behind this program, and we hope the time will come when it will be put into effect.

The Ladies

This is the Twenty-ninth Annual Meeting of the A.O.A., and I hope that successive meetings will show a larger and larger attendance of ladies. Women cast about sixty per cent of the votes in the last national election, and about seventy per cent of the beneficiaries of life insurance are women. Therefore they have an economic stake in our program to avert war, and they have the political strength to help put that program into effect. We hope that they will take more and more interest as the years go by because we are facing what amounts to a struggle for survival—nothing less—and we will need all the

help, inspiration, knowledge, and encouragement that we can get to handle the situation which confronts us.

Fundamentally, the idea behind the Army Ordnance Association was to save time. To those who lived through the early days of the first World War, the time that was wasted in needless backing and filling, bickering about what type of contract would be adopted, who would do what, and so forth, cried for correction. The original founders of the Association—practical patriots—decided that they would try to do something about saving time. They tried to accomplish everything that could and should be done ahead of time.

They looked up the casualties at the end of the first World War and found that they were pretty heavy. They thought that if they had just moved that whole show forward a little, some of those casualties might have been saved.

World War I

You will perhaps remember that in the first World War in spite of all the efforts we made we had to get our 75-mm. guns, 155-mm. howitzers, and 155 G.P.F.'s from the French, and our 8-inch and 9.2-inch howitzers from the British. So, if some one asks whether or not all our activity between the wars was worth while, I think you could compare that situation of the first World War with what happened in the second World War when the industries of America were truly "the arsenal of democracy."

They not only furnished everything that was needed for our own Army, Navy, and Air Force, but they helped the British substantially. They were practically the complete supply facility for the French, and certainly contributed tremendously to the firepower and mobility of the Russians.

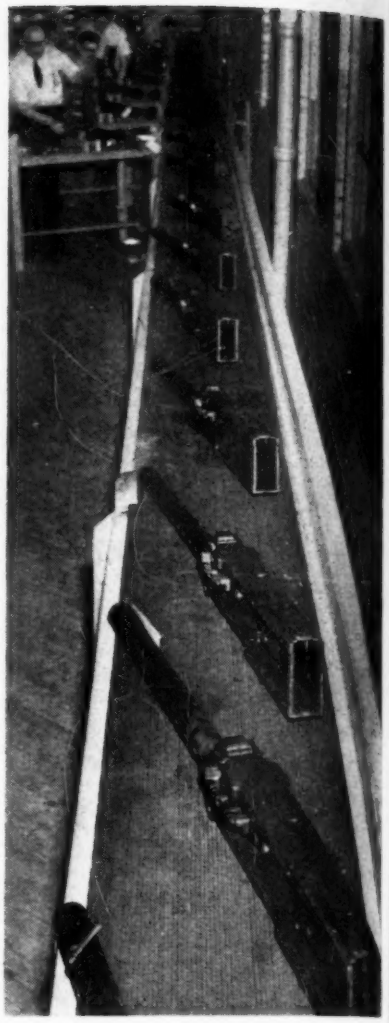
True, it was the Army Ordnance Association that was a lone voice crying in the wilderness for several years. But gradually the movement, as such, in or out of the Association, gained strength, and it was accomplishing something.

The motto the A.O.A. adopted was "Industrial preparedness against war as our surest guaranty of peace." It did not guarantee peace. All it did was save civilization, and that is quite an accomplishment in itself.

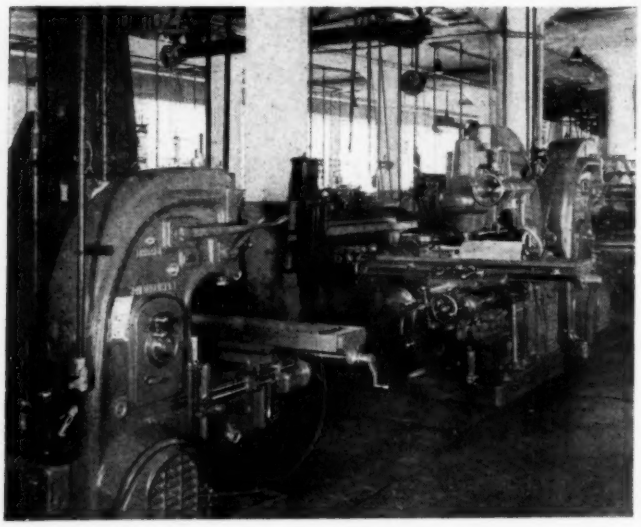
It was the things we accomplished ahead of time that enabled industry to swing into action and produce as it did, resulting in a loss to our armed forces of only about one-fifth as many killed as were lost by the Germans, Japanese, and Italians who opposed us.

It was a dirty business—kill or be killed—but it was a lot better that we had that ratio of one to five in our favor rather than five to one against us.

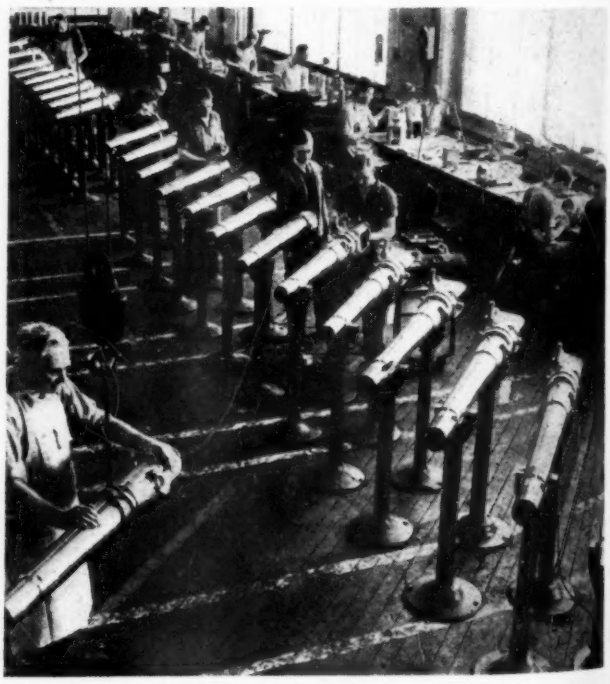
So, we come to this idea: We know how to work with each other. The Army and Navy and Air Force are in step when it comes to ordnance. American industry and engineering are interested in this movement and they are also in step. What we ought to do now is to raise our sights: If industrial preparedness could cut down the battle-death expectancy by eighty per cent in World War II, why can't we cut it down all the way and not have a World War III?



America's fast production of superior weapons gave us the edge over the Axis.



Modern machines in arsenals guided industry in war production.



Industrial know-how overcame years of enemy preparation.

The New Technology

AAF

New Aircraft Speeds Make Present Weapons and Fabrication Obsolete

by

Gen. George C. Kenney

Industry must learn anew to make bombs, machine guns, rockets, and instruments for effective use in tomorrow's aërial warfare

TWENTY-FIVE months ago the curtain went down on the final act of World War II. Using the weapons produced by American industry, the soldiers, sailors, and airmen of America had gained victory after 3½ years of bitter struggle.

From the very beginning I believe we realized that our industrial organization could give us the tools to do the job and give them to us before it was too late. But I am quite sure that our enemies did not realize our industrial potential or they would never have started the war in the first place.

The thing for us to remember is that they know it *now,* that every one else knows it, and that if some future aggressor ever decides to make a bid for world dominion, he knows that he must destroy that potential if he is to have any chance of victory.

In other words, you have so well advertised yourselves that you have now become the primary target in case of another world war.

The Only Answer

The only answer is national preparedness: Preparedness of our land, sea, and air forces; preparedness of our industry to be ready at the first sign of trouble to start production of the tools that those forces must have to prosecute the war; and preparedness of the people of this country to support adequate national-defense forces in time of peace as well as after the bombs begin to fall.

In the armed forces we cannot afford to live on the reputations we made from December 7, 1941, to August 14, 1945. We must now think in terms of modern war. World War II is not modern—it is out of date. We must look *forward* from the past and its lessons—not *back* to the past.

While you representatives of industry have much to be proud of for your stupendous achievements during that period, you cannot afford to live

General Kenney, Commanding General, Strategic Air Command, United States Air Force, delivered this address at the Twenty-ninth Annual Dinner Meeting of the Army Ordnance Association, the Waldorf-Astoria, New York City, October 1, 1947.

on your past reputations. The problem has changed. The weapons are changing. Old weapons are being so radically redesigned that soon the veteran of World War II will hardly recognize them. New weapons are being developed, new tactics devised. The only thing that remains constant is the man, and even he must keep on his toes or the parade will pass him by.

Battle of Machines

Warfare is becoming more and more a battle of machines with brains directing the use of those machines. If we can keep ahead in our technical development we will be all right, but if we fall behind and allow ourselves to get into a position where we have to pit man power against man power we will be playing a losing game.

We are only a hundred and forty million in a world of two billion. We don't want to, and we can't afford to, win our wars by mass spending of blood. We must us our brains and the machines developed by those brains. That is where our true superiority lies, not in mere numbers of men.

In the past, most of your work was for the Army Ordnance Department, but from now on you will have to work and visualize the problems involved in working for the Department of National Defense—for the Army, the Navy, and the Air Force—the three members of the team welded together in the crucible of the last war and now incorporated into an integrated instrument for the preservation and maintenance of what we have come to call our American way of life.

Speed Means Trouble

High speeds of aircraft that are already approaching that of sound and will soon become supersonic have brought a host of troubles into the picture. The old reciprocating engine that you built for us by the hundreds of thousands is being superseded by the turbine and the jet. The metals that you worked with a couple of years ago would be useless in the heats encountered in the jet power plant.

Perhaps you thought that you were working to close tolerances when you made our aircraft for World War II. I assure you that those simple riveting jobs won't do in the modern fighter or bomber whose surfaces have to be not only really true airfoil sections to a tolerance of plus or minus three thousandths but have to be as smooth as polished glass. We can gain fifteen miles an hour on a jet fighter by a smooth paint job over the normal polished aluminum surface, but when the continual flexing of the wings puts a few cracks in the paint we lose twenty-five miles an hour. So far we haven't been able to develop a paint that doesn't crack. Perhaps your research laboratories can solve that problem for us.

Our instruments that were satisfactory for 400 or even 500 miles an hour are too crude for the modern speeds.

Those of you who made aircraft propellers have got to learn a new trade the next time. We probably won't use them on our new combat aircraft.

In the armament field it looks as though we have got to start all over again. Our bombs are all obsolete for the new high-speed aircraft. The present shapes are so poor aërodynamically that no one knows where they would hit if they were released at modern speeds. They would simply tumble all over the sky, shedding fins and possibly detonating themselves by the violence of their own gyrations if dropped from a bomb bay at a speed of, let us say, 600 miles an hour.

New Bombs Needed

Our new bombs have got to be true aërodynamically and with surfaces that are as smooth as the airplane that carries them. The fuzes will no longer be simple contact affairs. Inside the bomb casing in addition to the explosive charge will be all kinds of electronic devices to guide the bomb to its target. Those of you who thought that all you had to do was to wrap up some TNT in a piece of pipe with a fin on the end of it are due for a rude awakening!

In the airplane of tomorrow, the aircraft machine guns and cannon that you struggled with a short while back would be slightly better than the cannon the English used at the Battle of Crécy 500 years ago.

Our best rate of fire today is around 1,200 rounds a minute with a muzzle velocity of approximately 3,400 feet a second, so that the time between bullets is one-twentieth of a second and the distance between those bullets about 170 feet. In one-twentieth of a second a 600-mile-an-hour fighter moves forty-four feet so that it might pass untouched across a directed stream of such bullets. You can see that if we want to be sure of hitting airplanes in air combat we have got to get these bullets closer. That means higher rates of fire as well as multiple gun installations with all those complications added to the problem.

For the higher rates of fire, tougher metals that won't erode and that can withstand terrific heats have got to be developed. I can almost hear the groans from some of you who will have to machine those metals.

Technical Development Rapid

In other words, don't look at our industrial planners with a jaundiced eye when from time to time they come around to you and start talking about an entirely new field of manufacturing or a lot of radical changes in the plan you have already spent a lot of time on. It may be aggravating, but the fact remains that the rate of technical development of weapons of warfare is now so rapid and the effect of changes in technique so far reaching that it has become fatal to the national security to lag behind in development or in thought.

When World War II was suddenly ushered in at Pearl Harbor on December 7, 1941, our industry rose to the occasion and got into production of war materials at a rate that astonished the world, including ourselves. But we must not forget that we had had a lot of time to watch the Nazis and the Japanese at work.

The next time the warning will be a matter of hours—not months. Our changeover must take place even faster than before.

Our initial forces, therefore, will not be large enough to carry on very long. Their machines, their weapons, their munitions, will last even less time than the personnel. Your job will be to replenish that supply of the tools essential to victory. That victory will be impossible if the delivery of the tools takes too long. Your planning for the job must be thorough, flexible, and forward looking. It must visualize the possible effects if the aggressor's initial air attack reaches some of our centers of industry and population.

The time for that planning is not next year, next month, or even tomorrow—*it is right now!*

British photo.

Unity for Defense

The Goal of the Canada-U. S. Permanent Joint Board

by

Gen. A. G. L. McNaughton

The Joint Board exists for the purpose of effecting the coördination of the efforts of the armed forces of the United States and Canada to counter any threat which may be directed in the future against the security of this continent.

THE objectives which your Association has set for itself and your success in achieving them are vital from the point of view of the Canada-U. S. Permanent Joint Board on Defense.

This Joint Board exists for the purpose of effecting the coördination of the efforts of the armed forces of the United States and of Canada to counter any threat which may be directed in the future against the security of this continent.

The Board, therefore, takes the greatest satisfaction in the progress which either country may make in the development of more effective military equipment of all sorts and in the creation of arrangements for their rapid production when the occasion may so require.

Established in 1940

Our Permanent Joint Board on Defense, as many of you will remember, was established in the dark days of 1940 when there was a grim possibility that the Nazi tyranny would overrun Europe and that the forces of democracy might be driven back from the United Kingdom which was then our last remaining bridgehead across the wide spaces of the North Atlantic. If that had come to pass, it is undoubted that it would have soon been followed up by attack on our homes in Canada and in the United States.

In August of that very anxious year, the President of the United States and the Prime Minister of Canada met at Ogdensburg in the State of New York. From there they issued the joint declaration which established the Joint Board on Defense to consider, in the broad sense, the defenses of the northern half of the Western Hemisphere.

I like to think that this declaration was the logical consequence of the harmony which had been developing between our countries without interruption since the War of 1812.

I think the declaration traces particularly to a promise which President

General McNaughton, Canadian Army, is president of the United Nations Atomic Energy Control Board. He delivered this address at the Twenty-ninth Annual Dinner Meeting of the Army Ordnance Association, the Waldorf-Astoria, New York City, October 1, 1947.

Roosevelt had given two years before when he was in Kingston at Queens University to accept an honorary degree. President Roosevelt then said: "Canada is part of the sisterhood of the British Empire. I give to you assurance that the peoples of the United States will not stand idly by if domination of Canadian soil is threatened by any other empire."

Canada's Obligations

To this statement our Prime Minister, Mr. King, responded immediately for Canada: "We, too, have our obligations as a good and friendly neighbor, and one of them is to see that our country is made as immune from an attack or possible invasion as we can reasonably be expected to make it and that, should occasion ever arise, enemy forces should not be able to pursue their way either by land, sea, or air to the United States across Canadian territory."

The chairman of the American section of the Board, from its inception in 1940 until his very greatly regretted death two weeks ago, was Fiorella LaGuardia. I had the privilege of working with him as a colleague during the last two years, and I know intimately of the great contribution which he made, both in this period and earlier, to the mutually satisfactory solution of the many complex problems of defense which Canada and the United States had to prepare to meet during the war.

I would say, too, that he made an equally significant contribution to the other—and perhaps even more difficult—problems with which we have been faced in the transition period and which may again at any time spring into pressing importance in this unstable world in which we live.

In this connection, I would like to mention especially the important part which Mr. LaGuardia took in the discussions by the Board which led up to the announcement made on last February 12th by our two governments—from Washington and Ottawa respectively—that the wartime coöperation between our armed forces was to be maintained into the postwar period.

Continuing Collaboration

Through this continuing and intimate collaboration, not only would our own defense be promoted, but also the coöperation of our countries for the maintenance of international peace and security could thereby be fulfilled more effectively.

The principles which have been established to promote this coöperation of our armed forces include "the interchange of selected individuals so as to increase the familiarity of each country's establishment with that of the other country." The "mutual and reciprocal availability of military, naval, and air facilities," and the continued provision with a minimum of formality for transit through its domain of military aircraft and public vessels of the other country.

Another provision of special interest to the Army Ordnance Association, because of your responsibilities in connection with new weapons and other military matériel, provides for "cooperation and exchange of observers in connection with exercises and development and tests of common interest."

In consequence, the way has been opened for the collaboration of our development and research agencies to the fullest extent we may find desirable.

Furthermore, I think that all of you, who are concerned with the business of mass production of equipment in the very short time which will be available in an emergency will agree that the provision for the encouragement of common designs and standards in arms, equipment, organization, methods of training, and new developments is of the most far-reaching importance. In a time of sudden danger, if this provision has been fully implemented, it may well mean the difference between failure and success in the defense of this North American Continent.

I would like to state further that these principles of coöperation to which I have referred are not merely a pious hope—they are being translated into action in many fields. I am sure that Mr. Forrestal, from his office as Secretary of Defense, will bear me out when I say there is now very close coöperation between the United States and Canadian forces in respect to arrangements for the security of this continent.

In this connection, I would mention particularly the satisfaction which the Canadian Army has taken in being able to extend their hospitality to many research and development detachments from the American Army at Fort Churchill on Hudson Bay and in making available the facilities which have been created there for cold-weather testing.

Joint Experiments

In the air forces we also have extensive joint experiments under way. We are coöperating in experiments in cold-weather flying and, what is even more difficult, cold-weather maintenance. We are coöperating in the establishment of weather-reporting stations in the north and of aids to air navigation. Many other matters of common interest and advantage are also receiving close attention. Thus I can report that eminently satisfactory progress is being made in developing cooperation between our respective armed forces for the defense of this continent in accordance with the joint announcement issued by our governments last February.

These arrangements are of great importance, both because of the positive measures which have been established between our respective armed forces and because of the mutual and reciprocal availability of military, naval, and air facilities in each country. However, they are important also by reason of the statements of what is not intended. In this respect they make clear to all the world that Canada intends to continue, as we have always done, to carry our full and proper responsibility for defense of our own territory and that all arrangements within our own territory will remain strictly under our own control. That is, as Mr. Truman said recently in the course of his visit to Ottawa, "Canada and the United States participate on the basis of equality, and the sovereignty of each is carefully respected."

With these provisions for the free and intimate discussion of mutual defense matters and for their orderly conduct through the medium of our Joint Board on Defense, no one in either of our countries, or in any other country of this hemisphere or elsewhere, need fear lest any of the precautions essential for the security of this continent are being neglected.

In all aspects of our arrangement for national defense, I can hardly overstate the importance which Canada attaches to the measures which may be taken by the United Nations to assure that peace and security are maintained throughout the world.

America Invests in Peace

Business Thrives by Constructive Enrichment of Society

by

Hon. James Forrestal
U. S. Secretary of Defense

"War does not provide permanent solutions to international political problems. We did not defeat Hitler and the Japanese to be conquered by their ideas."

AS Under Secretary and Secretary of the Navy I learned a good deal about this Association and the solid and practical assistance it rendered General Campbell as Chief of Ordnance of the Army.

It was also of substantial help to the Navy. Many of its members worked directly for the Navy, and through them the foundation was laid for cooperation between Navy and Army Ordnance. Col. James L. Walsh, president of the A.O.A., and his associates at all times did their best to bring about understanding and harmony between the services in solving joint problems.

As a matter of fact, it might be said that Public Law 253 of the Eightieth Congress, otherwise known as the Unification Act, had its practical beginnings in the relationship between Army and Navy Ordnance, particularly the personal relationships between Admiral Blandy and Admiral Hussey of the Navy and General Campbell and his successor, General Hughes, of the Army. These men showed that sincerity of purpose and honest effort at coöperation could pay high dividends.

This kind of coöperative effort represents my own philosophy in administering the National Security Act. That act is a practical and workable law, but the success of my associates and myself in carrying it out will be measured by the extent to which we can work together, with sympathy and understanding, for the great objective of an efficient and economic military plan.

Men, Not Charts

My three associates—Kenneth C. Royall, John L. Sullivan, and W. Stuart Symington—are men who think in these terms of coöperation and mutual support, and for that reason I am confident that we have a good working civilian team. That is what is necessary to run an organization. Men and not charts are the organizers of success in any human effort, whether we are dealing with armies, businesses, or politics.

I speak tonight as the head of the country's Military Establishment to a group of business leaders who have manifested in tangible fashion their interest in national security.

It might be presumed, therefore, that the main subject of my speech will be about war and how to prepare for it. Instead, I propose to speak about military effort and preparedness only in its relation to the maintenance of peace, and I shall point out how unsatisfactory war is as a solution to the ills of the international community.

Business Wants Peace

No group in any country is more desirous of maintaining peace than the people engaged in business. One of the many fallacies generated by Marx and Engels is the thesis that private ownership of property breeds war and that in particular the form of private ownership we know as business capitalism is provocative of war. Because this thesis has been reasserted during the past weeks, I should like to examine it.

Stripped to the bone, this Marxian postulate is that businessmen like yourselves drive nations into wars.

This theory as an interpretation of history, which it pretends to be, has no validity. Men of the jungles threw rocks at each other long before there were either industrialists or business managers. In more recent history, Napoleon led Europe through nearly a quarter century of unrest and war. But he certainly was not driven by the capitalistic society of France—he was a product of revolution. Careful research discloses not the slightest degree of historical support for the idea that businessmen have precipitated wars between great nations.

Nevertheless, we hear that American businessmen are instigating a new war, expecting to remove by such means the approaching menace of collapse and loss of profits. These reactionaries, we are told, are also responsible for scarcity and war talk and soon will be responsible for World War III.

That is utter nonsense! American business does not want war and neither does American labor. American business has supported its Government, as has American labor, in wars which were forced upon us by the madness and fanaticism of totalitarian leaders.

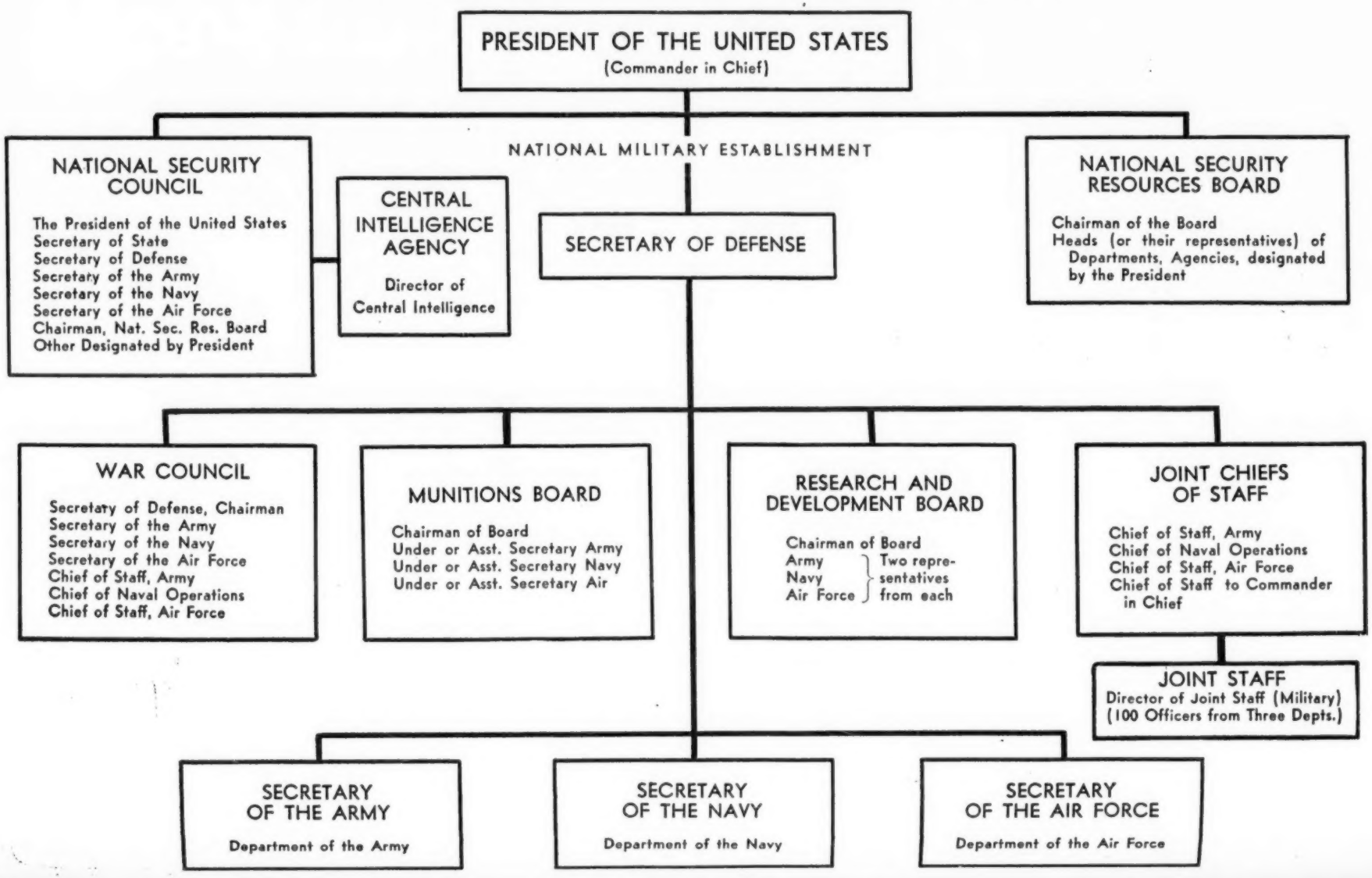
Investment In Peace

American business has its money invested in peace. In the past twenty months American industry has spent more than twenty billion dollars on capital expansion—on new factories, new stores, new utilities, new transportation, and new mines. These means of production and distribution are to make and to transport the goods of peace not only to our own nationals but also throughout the world. They were not built to manufacture munitions, and war would substantially impair the investment.

American businessmen base their actions on the assumption that increas-

Secretary Forrestal delivered this address at the Twenty-ninth Annual Dinner Meeting of the A.O.A. held in the Waldorf-Astoria, New York City, October 1, 1947.

ORGANIZATION FOR NATIONAL SECURITY


PRESIDENT OF THE UNITED STATES
(Commander in Chief)
NATIONAL MILITARY ESTABLISHMENT
NATIONAL SECURITY COUNCIL
The President of the United States
Secretary of State
Secretary of Defense
Secretary of the Army
Secretary of the Navy
Secretary of the Air Force
Chairman, Nat. Sec. Res. Board
Other Designated by President
CENTRAL INTELLIGENCE AGENCY
Director of Central Intelligence
SECRETARY OF DEFENSE
NATIONAL SECURITY RESOURCES BOARD
Chairman of the Board
Heads (or their representatives) of Departments, Agencies, designated by the President
WAR COUNCIL
Secretary of Defense, Chairman
Secretary of the Army
Secretary of the Navy
Secretary of the Air Force
Chief of Staff, Army
Chief of Naval Operations
Chief of Staff, Air Force
MUNITIONS BOARD
Chairman of Board
Under or Asst. Secretary Army
Under or Asst. Secretary Navy
Under or Asst. Secretary Air
RESEARCH AND DEVELOPMENT BOARD
Chairman of Board
Army
Navy
Air Force
Two representatives from each
JOINT CHIEFS OF STAFF
Chief of Staff, Army
Chief of Naval Operations
Chief of Staff, Air Force
Chief of Staff to Commander in Chief
JOINT STAFF
Director of Joint Staff (Military)
(100 Officers from Three Depts.)
SECRETARY OF THE ARMY
Department of the Army
SECRETARY OF THE NAVY
Department of the Navy
SECRETARY OF THE AIR FORCE
Department of the Air Force

ing markets for goods will come from the maintenance and extension of high standards of life in our own country and ultimately throughout the world. Decent standards of living shrink and diminish in wartime.

Business has earned its place by constructive enrichment of the society which the businessman serves—not by the violent destruction of it.

The final and overriding reason that businessmen do not want war is because they are men of intelligence and therefore know the terrible waste of human life that wars involve—the waste of the best—the young, the brave, and the generous.

War does not provide permanent solutions to international political problems, however much misguided leaders of states sometimes think it does. Rather it is the confession of the failure of men to deal successfully with each other by reason and negotiation rather than through violence. *War substitutes the law of force for the force of law.*

Wars might be a solution if, as in ancient times, the conqueror were willing to kill all his enemies after battle, as in Caesar's Commentaries we are told that Vercingetorix did to the Swabians. Or wars could provide a solution if the conqueror were willing to make the conquered his slaves—to rule with the machine gun, the whip, and the concentration camp.

But free people are not willing to take either of these courses. We did not defeat Hitler and the Japanese to be conquered by their ideas. To accept and practice such methods would be to admit that we had been infected by the very disease we undertook to control.

War No Solution

Wars do not provide final solutions for international problems. They frequently merely extend and intensify them. But we in the United States cannot permit our military forces to deteriorate until the United Nations is a going concern and until it becomes an effective agency for peace.

There is not a man in this audience who is not desperately anxious to see the world embark upon a century of peace and of reconstruction and repair of the terrible physical and spiritual damage which mankind has suffered in six years of war.

But I also believe that no one in this audience will differ with this statement: Until all nations are willing to accept the principle of the rule of law rather than the rule of force it would be as foolish to risk unilateral disarmament as it would be to abolish fire departments in the hope of ending all fires.

A Great British statesman, Lord Haldane, who was responsible for the reorganization of the War Office of Great Britain and who served as Secretary of State for War from 1905 to 1912, observed that one of the chief difficulties of statesmen was in steering

"War substitutes the law of force for the force of law."

a middle course between the extremists who exist in every country—those who want to go to war at the slightest pretext by next Monday and those who wish to advertise that their nation will never fight, no matter how severe the provocation.

To some extent the position of the United States today is comparable to that of Great Britain after the defeat of Napoleon's effort to establish his Continental system and to export Bonapartism throughout the world. Great Britain had been the balance which prevented his victory. You will recall Napoleon's contempt for that tight little island and its people. They were, he said, a nation of shopkeepers; yet the sons of those shopkeepers at Salamanca and Waterloo wrote finis to his dreams of conquest.

The British then were and are now traders, shopkeepers, merchants, manufacturers, exporters, bankers, and workers. And so are Americans. It is that complex of business energy—a combination of the salesman, the engineer, the works manager, the worker, and the accountant, with the synthesis over all of management itself—that developed this great continent. It can do the same for the world—not by way of conquest but by way of service.

Industry Armed the UN

During the war, American capital and labor not only armed this Nation but produced and transported to our allies 46 billion dollars of munitions—enough equipment to outfit 2,000 infantry divisions, 588 armored divisions, and 6 air forces as large as our own largest air force—the Ninth. Since the war, American capital, labor, and business have exported $3,400,000,000 of food, $4,500,000,000 of machinery, and $2,300,000,000 of textiles in addition to billions of dollars' worth of other goods.

All of this was done by a nation functioning under that supposedly weak form of government—democracy—and under that supposedly inefficient economic system—capitalism.

A Great Mission

The United States has a great opportunity and a great mission. At the moment it is the only source of food, of goods, and of credit for the stricken people of the world. In extending all three there is no motive back of our effort except the enlightened altruism of the realization that a stable and decent world is a better world for Americans to live in.

We have no desire to conquer the persons or the property of other people nor any desire to control their ideas and their thoughts. We think of human beings all over the world, toiling upward painfully and slowly toward the light of greater freedom and greater well-being, not as a vast amorphous mass of faceless men but as a collection of individuals, each carrying in his soul and in his heart the light of God's grace, entitled to be considered as a human entity and not as a mobile item on an anthill.

New Sacrifices

In carrying out our mission we may be called upon to incur new denials and make new sacrifices. I am confident that under the direction of President Truman and with the support of the wise and understanding leaders of both political parties we will not refuse to make them.

The last war cost us 340 billions. In 1945 alone, President Truman canceled war expenditures totaling 56 billions. Even if the needs of Europe rise to several billions a year—is that too high a price to pay if we can arrest the wave of misery, of disaster, and of suffering which now threatens that continent and its people? I believe America will respond to the challenge.

The only cold war that we are waging is against hunger and desolation, against oppression and tyranny, against disease and despair wherever they exist. That has been our philosophy and faith since the founding of the Republic. And it still is.

A.O.A. Medalists, 1947

Association Confers Honors for Distinguished Service

AT the Twenty-ninth Annual Dinner Meeting of the Army Ordnance Association in the Grand Ballroom of the Waldorf-Astoria, New York City, October 1, 1947, five outstanding citizens were honored by the Association "in recognition of faithful, patriotic service to the national defense of our country."

The recipients were: James Forrestal, Secretary of Defense, who received the Williams Gold Medal; Henry L. Stimson, Secretary of War during World War II, who received the Crozier Gold Medal; Edward B. Gallaher, Clover Manufacturing Company, Norwalk, Conn., author of the A.O.A. Business Letter, who received the Crowell Gold Medal; Reginald E. Gillmor, Sperry Corporation, New York, N. Y., Director of Industry, American Mission to Greece, who received the Scott Gold Medal.

The medals were presented at the opening of the dinner meeting and were conferred by James L. Walsh, president of the Association. The citations accompanying each award were read by Charles Deere Wiman, chairman of the Association's Committee on Awards.

Mr. Wiman also read a letter from Mr. Stimson, who was unable to be present because of reasons of health, which said in part:

"When I tell you that General Crozier was one of my very closest friends and advisers, not only in official life but also in personal life, and that Mrs. Crozier still remains a very dear friend of Mrs. Stimson and myself, you will understand how difficult it is for me to say that I shall be unable to come to the annual meeting of the Army Ordnance Association at the Waldorf on Wednesday evening, October 1st. . . I value very greatly the honor of having been awarded the Crozier Gold Medal."

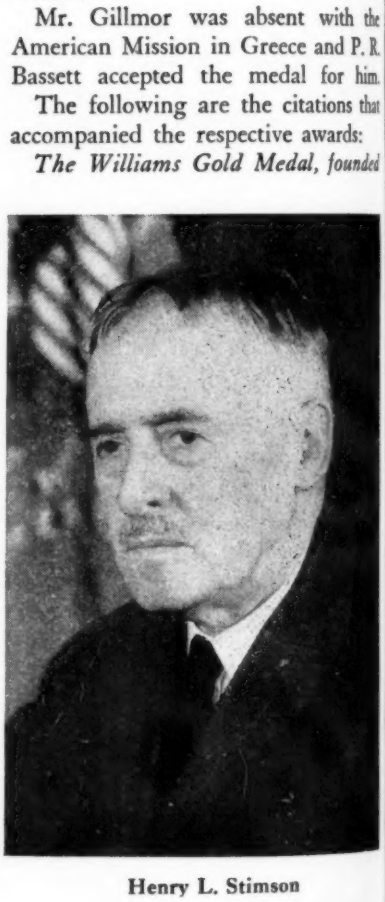
The medal will be personally presented to Mr. Stimson by Colonel Walsh.

Mr. Gillmor was absent with the American Mission in Greece and P. R. Bassett accepted the medal for him.

The following are the citations that accompanied the respective awards:

The Williams Gold Medal, founded

James Forrestal



Henry L. Stimson

COMPLETE ROSTER OF ARMY ORDNANCE MEDALISTS 1930-1947

The Williams Gold Medal (founded 1930).—Awarded to:
Maj. Gen. C. C. Williams, 1930
Maj. Gen. C. M. Wesson, 1942
Brig. Gen. Benedict Crowell, 1946
James Forrestal, 1947

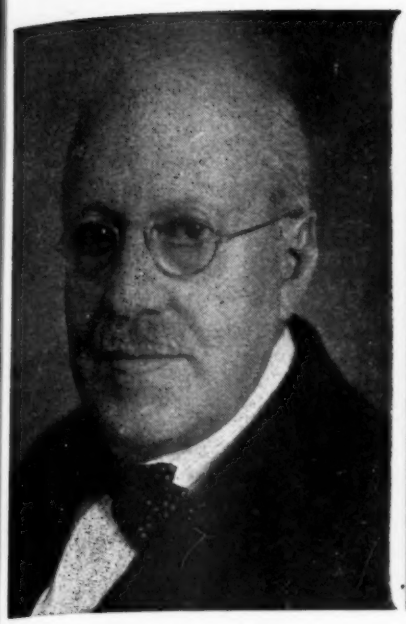
The Medal of Merit (founded 1931).—Awarded to:
Col. R. P. Lamont, 1931
Maj. Gen. William Crozier, 1931
Col. William C. Spruance, 1931
Brig. Gen. Guy E. Tripp, 1931
Maj. William P. Wilson, 1931
Col. Frank A. Scott, 1932
Brig. Gen. John H. Rice, 1932
Brig. Gen. C. L'H. Ruggles, 1932
Newton D. Baker, 1935
Bernard M. Baruch, 1935
Col. Rogers Birnie, 1935
Maj. Gen. James G. Harbord, 1935

The Crozier Gold Medal (founded 1941).—Awarded to:
Col. James L. Walsh, 1941
Lieut. Gen. L. H. Campbell, Jr., 1944
Maj. Gen. James H. Burns, 1946
Henry L. Stimson, 1947

The Scott Gold Medal (founded 1941).—Awarded to:
Col. Herbert W. Alden, 1941
Rear Adm. W. H. P. Blandy, 1944
Col. Herbert A. Gidney, 1946
Reginald E. Gillmor, 1947

The Rice Gold Medal (founded 1941).—Awarded to:
John C. Garand, 1941
Tom M. Girdler, 1944
Maj. Gen. C. T. Harris, Jr., 1944
Harvey C. Knowles, 1946
Charles K. Davis, 1947

The Crowell Gold Medal (founded 1946).—Awarded to:
Col. William W. Coleman, 1946
Brig. Gen. John Ross Delafield, 1946
Brig. Gen. Samuel McRoberts, 1946
Col. Frederick H. Payne, 1946
Brig. Gen. Richard H. Somers, 1946
Col. Henry Parsons Erwin, 1946
Edward B. Gallaher, 1947



Edward B. Gallaher

Reginald E. Gillmor

Charles K. Davis

in honor of Maj. Gen. C. C. Williams, Chief of Ordnance, United States Army, 1918-1930, awarded to

JAMES FORRESTAL
Secretary of Defense

"For distinguished service in the advancement of American ordnance in the field of munitions preparedness. The Army Ordnance Association acclaims James Forrestal for his leadership, foresight, and skill in directing the mighty naval forces of the United States in their brilliant achievements throughout World War II and for his contribution to the advancement of science, engineering, research, development, and production of superior American weapons for victory in World War II."

The Crozier Gold Medal, founded in honor of Maj. Gen. William Crozier, Chief of Ordnance, United States Army, 1901-1918, awarded to

HENRY L. STIMSON
Secretary of War During World War II

"For distinguished service in the advancement of American ordnance in the armed services of the United States —ground, sea, and air. Soldier, statesman, administrator, and humanitarian, Henry L. Stimson is acclaimed by the Army Ordnance Association for his leadership, vision, and steadfastness in applying the strength of American military might, science, engineering, and industry in the attainment and preservation of peace."

The Crowell Gold Medal, founded in honor of Brig. Gen. Benedict Crowell, Director of Munitions, 1918, and president of the Army Ordnance Association, 1919-1945, awarded to

EDWARD B. GALLAHER
Clover Manufacturing Company, Norwalk, Conn.

"For distinguished service in the advancement of our national economy to keep America strong. The Army Ordnance Association gratefully acknowledges the preëminent service being performed by Edward B. Gallaher, economist, manufacturer, and business executive. Through his voluntary service as author of the Army Ordnance Association Business Letter he continues to bring home the fundamental truth that our economic health is a vital factor in our national security and international peace."

The Scott Gold Medal, founded in honor of Col. Frank A. Scott, first Chairman of the General Munitions Board and of the War Industries Board, 1917-1918, awarded to

REGINALD E. GILLMOR
Sperry Corporation, New York, N. Y.; Director of Industry, American Mission to Greece

"For distinguished service in the advancement of industrial preparedness. The Army Ordnance Association felicitates Reginald E. Gillmor for his leadership, industry, and executive ability in war and in peace in the production of superior armament in coöperation with the armed forces of the United States. Throughout the years preceding World War II his steadfastness and loyalty to the cause of industrial preparedness became an example for the emulation of all American industry in the winning of World War II."

The Rice Gold Medal, founded in honor of Brig. Gen. John H. Rice, Chief of Ordnance, American Expeditionary Forces, 1918, awarded to

CHARLES K. DAVIS
Remington Arms Company, Bridgeport, Conn.

"For distinguished service in ordnance engineering. The Army Ordnance Association acclaims Charles K. Davis for his leadership, skill, and tireless devotion in the management and operation of vast industrial facilities for the production of small arms and small-arms ammunition in World War II. As chairman of the Association's Small Arms Division, he continues to render loyal service in the solution of production engineering problems of American small arms—the equipment with which the American soldier is supreme on the battlefield."

(The complete roster of A.O.A. Medalists appears on the facing page.)

Twenty-ninth Annual Meeting of the A.O.A. at Aberdeen Proving Ground

by

Dr. John J. O'Connor
ORDNANCE EDITORIAL STAFF

THE unique feature of the demonstration of ordnance matériel that marked the Twenty-ninth Annual Meeting of some three thousand Army Ordnance Association members at Aberdeen Proving Ground, Md., on October 2, 1947, was that Ordnance technical achievements, in peace and war, were seen for the first time in historical perspective.

Study in Contrasts

In the past, the performance of modern ordnance, although it always satisfied the highest expectations, could not be judged against the backdrop of earlier tests, experiments, trials, successes, and partial failures. In short, without a measuring rod or standard of comparison the accomplishments of Ordnance and industry could not be fully evaluated. The 1947 program provided this standard of comparison.

Perhaps the most startling news at Aberdeen last year, revealed in a token demonstration, was that the economical use of missiles is now possible, even to the extent or predetermining not only the velocity and direction of projectiles but even of individual fragments.

A second very recent achievement is that the tracking and location of missiles at great distances, heretofore thought impossible, can now be done with amazing speed and precision. The demand for observations of long-range missiles in flight is being met by new optical instruments that combine the principles of astronomical telescopes and antiaircraft tracking.

Confidence in Ordnance was further strengthened by a panoramic display of the remarkable progress that Ordnance has achieved in design and manufacture during the past three decades—an encouraging augury that future developments in ordnance matériel will equal and perhaps surpass the accomplishments of bygone years.

It was an inspiring sight, for example, to see a Locomobile staff car of World War I vintage, used by General Pershing in France and still operable, pass slowly before the reviewing stand. There were ghosts in that car—or so it seemed—ghosts of gallant fighting men of the American Expeditionary Forces who rode with Pershing to and from the muddy battlefields of Château-Thierry, Verdun, Soissons, and other historic areas.

Automotive Demonstration

Pershing's staff car was immediately followed by a Packard staff car, Model 1942, sleek, shiny, and streamlined, that saw combat service in World War II.

A primitive White reconnaissance car, Model 1917, and a crude GMC ambulance, Model 1918, were followed by a jumping jeep of World War II fame. May the tribe of jeeps never grow old! This particular jeep, towing a 37-mm. gun, left the road and buzzed off unconcernedly across the rocks and ruts of the adjacent terrain.

The madcap jeep was accompanied, in more stately fashion, by a modern ¾-ton command and reconnaissance car, a ¾-ton weapons carrier, and a 1½-ton truck. These latter vehicles used the same component parts and were designed to meet general requirements for the transportation and the towing of light weapons.

Aberdeen showmanship, having

whetted an appetite for spectacular contrasts, next proceeded to pass in slow review an old-fashioned creaking 4x2 Liberty truck with solid tires, accompanied by an equally decrepit 6x6 Liberty truck with, marvelous to behold, pneumatic tires!

The next item was a sturdy 1½-ton 4x4 cargo truck used by tactical units prior to World War II. This was followed by the reliable workhorse of the Army Ground Forces in World War II —the 2½-ton 6x6 cargo truck.

For contemplated use in the rice paddies of the Orient, and in swampy terrain generally, Ordnance developed a 2½-ton 4x4 cargo truck. This truck has a high ground clearance and is capable of fording streams to a depth of sixty-five inches.

The smallest wheeled vehicle currently used by the Army is the ¼-ton 4x4; the largest development vehicle is a monster 25-ton 6x6 tractor.

Next on the automotive menu was an early World War II scout car and a pioneering half-track scout car, both designed to provide greater mobility and heavier load-carrying capacity. The half-track chassis was used as a carriage for many artillery items, from the 37-mm. gun up to and including the 105-mm. howitzer.

But the Army was not satisfied with the relatively slow-moving half-track as a scout car. The result was that Ordnance turned out the familiar Armored Car M8 and the Armored Utility Car M20. Both combined speed, armor, and hitting power.

Exciting Tank Display

The exciting tank display received enthusiastic applause. The first item was a tiny 3-ton development relic of World War I that utilized, or tried to utilize, the power plant of the old Model T Ford car. No longer operable, the venerable Ford passed the reviewing stand, like an old man in a wheel chair, on a modern tank transporter. Next on display was a 6-ton Renault, Model 1917, a design adopted from the French and the first tank produced and used during World War I.

The gradual evolution of tank design was illustrated by two light tanks of the M3 series (*circa* 1939). Still more recent was a light tank of the M5 series that gave a great amount of service in World War II until it could be replaced by more modern tanks of the M24 series.

In the medium-tank class, six models were shown. The most recent tank in this series, the T23, employs an electric-drive unit on a chassis consisting of components of the M4 series. The present Medium Tank M26 went into action against the Germans in the early months of 1945 and is still standard equipment in today's Army.

Heavy Tanks

Only three heavy tanks were shown.

The first was a clumsy monster, the Mk. VIII, the largest tank manufactured for use by General Pershing's boys. A more recent development, the T-32, incorporates a high-velocity 90-mm. gun with effective armor. It uses the Ford V-12 tank engine, a new cross-drive transmission, and is steered by a single "joy stick" much like an airplane. The last item was the T28—a superheavy model that weighs approximately 100 tons.

The self-propelled artillery and tank destroyer display began with a gun motor carriage with a 4.7-inch gun, produced by Rock Island Arsenal in 1922. At the start of World War II, gun motor carriages, like the 75-mm. Gun Motor Carriage M3, were half-tracks and saw extensive use on many battlefields.

The 105-mm. Howitzer Motor Carriage M7, the famous "Priest" of North African fame, was soon superseded by the 90-mm. Gun Motor Carriage M36, popularly known as the "Slugger." It provided a worthy challenge to the notorious German 88-mm. gun and accounted for many German tank casualties. The first large gun motor carriage to be used in World War II was the 155-mm. Gun Motor Carriage M12, fondly known as "King Kong I." The King's brother, "King Kong II," was also on exhibit. The Army is now considering the adoption of a 240-mm. howitzer motor carriage which is still undergoing tests.

Amphibians

The earliest type of amphibious vehicle shown at Aberdeen was a tiny 1922 model that was capable of fording small streams. In World War II, quarter-ton trucks were provided with fording equipment that enabled them to take part in beachhead operations when discharged from landing craft.

Next in evolutionary descent came the Light Cargo Carrier M29C, affectionally known as the "Weasel." This carrier was developed originally by the National Defense Research Committee for operation in snow. Later it was adapted for water use by the addition of pontons and proved exceptionally versatile in amphibious operations. A seagoing truck, the DUKW, was first used in the Sicilian operation and continued to be used throughout World War II. Tanks are now provided with fording equipment, and even jeeps can be modified to go swimming.

In the afternoon, after a hearty lunch and visits to the Foreign Matériel Museum and other exhibits, A.O.A. members witnessed a small-arms test. Submachine guns, brutally subjected to rain, dust, and mud tests, came through with flying colors. Three machine guns were then fired for cyclic rate comparison. The rate of fire of these weapons was determined by the use of an electric timing device. Body armor materials were tested to determine resistance against caliber .45 bullets. The latest armor vest, the M12, incorporates aluminum and nylon—a combination that has high resistance qualities.

A demonstration of winterization tests underlined one of the most difficult of current Ordnance problems.

A bombing demonstration utilized the latest VT fuze, a rocket-assisted bomb, and the latest light-case bomb.

Combat Exercise

The concluding demonstration was a combat exercise designed to show the firepower and tactical use of the weapons supplied the doughboy in an Infantry battalion by American industry and Ordnance engineers. Rifles, automatic rifles, machine guns, mortars, chemical mortars, bazookas, rocket launchers, recoilless rifles, howitzers, tanks, and flame throwers—all were employed by an assault detachment in action against hypothetical enemy positions.

By general agreement, the 1947 demonstration was the best ever put on for A.O.A. members at Aberdeen. Spectators not only saw the best of modern weapons and equipment but were better able to appreciate present-day achievements by comparison and contrast with earlier types of ordnance.

Month by Month: A Review of the National Defense Situation

Industrial Preparedness.—Top national-defense officials, admitting some breakdowns in the Nation's industrial mobilization plan during World War II, assured the Senate War Investigating Committee that lessons learned in the last conflict already are being put to use in preparing for any future war.

Defense Secretary James Forrestal reached these general conclusions:

1. There should be recognition of the fact that, in an all-out war, planning must deal not only with military production and the training of armed forces but with the entire economy.

2. Planning must be done by grand divisions—man power, transportation, raw materials, food, fuel, etc.—and an organization must be set up competent to make proper allocations between the military and civilian components.

3. A peacetime organization—the Munitions Board—must plan, with industry, for the particular requirements of the military.

4. The individuals staffing a wartime War Production Board must be men from the armed forces and men from the various industries themselves.

5. Actual procurement contracts should be left with the armed services.

6. The Munitions Board should have a specific plan of wartime organization in being, with alternative divisional heads screened and, if possible, a man already selected for the top job.

7. There should be a man selected in advance to fill the position equivalent to the Director of War Mobilization.

8. Steps should be taken to ensure the closest liaison between the Joint Chiefs of Staff and the Munitions Board, on one hand, and the equivalent of the Director of War Mobilization on the other.

9. The Director of War Mobilization must be a man strong enough to resist popular pressures and well-organized publicity drives to secure special consideration for some plausible project.

10. Finally, and most important of all, the war planners should have people selected for all the key positions in any organization chart that is drawn up, all of whom should be currently familiar with the planning of the war setup.

Improved Atomic Weapons.—The United States is still producing and improving atomic weapons, the United States Atomic Energy Commission told Congress in its second semiannual report.

It added that the Commission was "stimulating advances on a broad front in fundamental nuclear physics, chemistry, and metallurgy," and that nuclear reactors of unique characteristics were now being designed.

The report warned, however, that relying on present knowledge of nuclear physics would be "disastrous," and that research and development on a "vast scale" were essential if the present lead was to be maintained.

In saying that the United States was still producing and testing atomic weapons, the report added that the Commission intended to "increase the present preëminence of the United States in atomic weapons" until Congress decided that such efforts could be relaxed without endangering national security.

It also disclosed that proving grounds for routine experiments and tests of atomic weapons were being established by the Commission.

The Commission's report declared that increased participation in the atomic-energy program was required from qualified private individuals and industrial enterprises—even at the cost of temporarily abandoning their present activities—if the Nation's preëminence is to be maintained.

The Commission's principal attention is given to the production of fissionable materials and atomic weapons. Known supplies of basic raw materials are being surveyed and new sources sought.

To maintain secrecy on work of military importance, security measures have been tightened. At the same time, the release of nonsecret information has been speeded. During the last year 1,200 scientific papers were declassified, and technical articles are being cleared for public release at the rate of 100 a month.

The body of nuclear knowledge acquired since the establishment of the Manhattan District, the wartime atomic agency, is being assembled in a 100-volume national nuclear-energy series, about half of which will remain classified as restricted data for use only by authorized persons. The rest of the material will be made generally available.

Isotopes are being produced and shipped to hospitals and research institutions in ever-increasing quantities. Shipments exceed one hundred a month. Requests have been received from a large number of foreign countries, but none of these have been filled.

More than ninety different kinds of radioisotopes, representing more than sixty elements, are now being produced. Costs are far below those of prewar production by means of cyclotrons. For example, it is estimated that one millicurie of carbon-14, now being sold for $50, would cost about $1,000,000 to produce in a cyclotron.

Our New Navy.—The Navy is experiencing a technological revolution which will alter profoundly all past concepts of sea power.

Three new heavy cruisers have been launched in the past year, and their 8-inch rapid-fire turrets are revolutionary in their automatism. Two light cruisers with 12-inch guns for use against either air or sea targets—also a revolutionary concept for guns of this size—are nearly ready.

Designs are being studied for two new high-speed submarines which will take advantage of design and engineering lessons learned from the Germans. Two submarines are being converted into experimental troop carriers, one into a cargo submarine, and the other into an Arctic "picket" boat.

Nine big Fletcher-type destroyers are being converted into destroyer-escorts for use against modern high-speed submarines.

Jet planes are becoming part of the carrier squadrons, and the Navy's long-range Lockheed Neptune, which holds the world's distance record and can carry the atomic bomb, is capable of thirty-six hours of continuous nonstop air patrol.

New ships and new functions call for new skills. The gunpointer and gun trainer, long important to the old Navy, are passing. Modern gunfire must be so rapid that automatic operation is

required; the guns will be aimed by radar and the gunlaying done instantly by electromechanical computations.

The lessons of Bikini already are being felt throughout the service; potential qualifications for skills not heretofore known to the fleet already have been compiled by the Bureau of Personnel.

American Air Power.—The best defense against air attack, according to Gen. Carl Spaatz, Air Force chief, is a quick and paralyzing retaliatory blow.

He told President Truman's Air Policy Commission that the following 6-point program would give the United States the power for such a blow:

1. A Regular Air Force of 70 combat groups and 22 separate squadrons equipped with 6,869 first-line planes, backed by a reserve of 8,100 modern aircraft. This will require 400,000 officers and enlisted men and 150,000 civilians.

2. An Air National Guard of 3,212 modern first-line planes, organized into 27 groups, plus an Air Reserve of 2,360 combat-type second-line planes.

3. A well-organized air defense system, employing a radar network placed as far from our shores as possible and operating at all times.

4. A sound, healthy, and "expansible" aircraft-manufacturing industry and air-transport industry. The former should build a minimum of 3,200 military planes of 46,414,000 pounds' airframe weight annually to keep the Air Force modern and the industry healthy.

5. An adequate research and development program to keep America ahead of other powers.

6. A better industrial-mobilization program.

The present 3.3 billion dollar Air Force appropriation will provide only for 55 combat groups, plus a skeletonized organization for the other 15 groups deemed the necessary minimum.

Opportunity for Commissions.—New and attractive opportunities for appointment in the Military Intelligence Section of the Officers' Reserve Corps, up to the grade of colonel, have been opened up by the recent publication of War Department Circular 208, 1947.

The opportunities for Counter Intelligence Corps specialization ot the Military Intelligence Reserve are equally available to individuals with or without previous military experience who possess technical knowledge or skills closely adaptable to the type of duties performed by agents of the Counter Intelligence Corps.

The grades offered are commensurate with the training and experience offered by the applicant.

Headquarters of the Counter Intelligence Corps are located at Camp Holabird, Baltimore 19, Md.

Army Commands Renamed.—The Army recently announced changes in names, but not in functions, of four of its overseas commands.

The Panama Canal and Antilles Departments will be consolidated at Quarry Heights, Canal Zone, and called "United States Army, Caribbean," with jurisdiction in the Canal, Puerto Rico, the Virgin Islands, and leased Army bases in the West Indies and British Guiana.

The Alaskan Department is renamed "Headquarters, United States Army, Alaska," in charge of all Army troops and installations in Alaska, including the Aleutians.

The Hawaiian Department as such disappears, and "Army Ground Forces, Pacific," becomes "United States Army, Pacific." Jurisdiction as before will include Army troops in the Central and South Pacific.

"Headquarters, Ground and Service, Europe," hereafter will be "Headquarters, United States Army, Europe."

The changes are to standardize the naming of ground elements outside the United States. The new names do not change existing unified commands.

The Marshall Plan.—Secretary of State George C. Marshall said last summer that the United States would consider assistance to those nations of Europe which would coöperate individually and collectively in a program to restore European economy.

The United States, once these nations had determined what reconstruction measures they could accomplish by themselves, would then determine what assistance it might extend to complete the task of European recovery.

The three major points in the Marshall Plan are as follows:

The dislocations of European life in these years immediately following the war are far more serious and deep-seated than was at first assumed.

To remedy the situation requires the breaking of a vicious circle caused by a shortage of goods for exchange coupled with monetary deterioration and the restoring of the confidence of the European people in the economic future of their own countries and of Europe as a whole.

Unless Europe regains economic health and, through this, political stability, there can be no assured peace for the world.

United States policy, according to Secretary Marshall, should be aimed at the revival of a working economy in the world so as to permit the emergence of political and social conditions in which free institutions can exist.

But American aid in this direction in the future should not be piecemeal. It should provide a lasting cure and should not merely alleviate crises.

Hemispheric Assistance.—George S. Messersmith, former Assistant Secretary of State, recently called for a speed-up in our program of economic assistance to Latin-American countries.

Mr. Messersmith received the Americas Award, given annually to "one who has contributed most greatly to friendship and understanding among the Americas."

He pointed out that "we as a government have indicated that it is a definite policy of ours to aid in programs of sound industrial and agricultural development in the other American republics. We shall have to move forward more rapidly in this program."

Economic unrest in many American countries, regardless of the competency of the governments, Mr. Messersmith said, is becoming a greater problem, the answer to which lies in evolving common solutions.

"The indigenous Communist movements," he added, "have already assumed serious proportions in more than one country. These are not really Communist movements, but they are movements of revolt against the failure of traditional parties to give adequate thought and action to basic economic problems."

The Cutting Edge

GENERAL EISENHOWER hailed the recent meeting of Army Ordnance Association directors at West Point as typifying "the acute need in this country for close and continuing coöperation between our organized military services and the vast American industry that supports them."

¶ As the Supreme Commander, Allied Expeditionary Forces, General Eisenhower conceived and carried through to success the largest, most complex, and most difficult military, naval, and aërial campaign in history. He therefore speaks with authority universally recognized.

¶ American industry will do well to take to heart the General's dictum that "the security of this country depends directly and inescapably upon effectiveness of coördination between the industrial fabric of the country and the fighting forces which, even in war, are merely the cutting edges of a great machine for which the power is supplied by the productiveness of the entire population."

¶ The General says this with the becoming modesty of a gallant soldier whom history will place among the great captains of all time.

¶ The machine of which the General speaks has many parts—all of them essential to its smooth operation. As he points out, "To assure the integration of these vast organisms in time of great emergency, foresight and common planning during years of peace are mandatory. Every individual in our productive processes, particularly the leaders of our great industrial organizations, must feel as direct a responsibility for the present and future security of the country as does any soldier in uniform."

¶ Emphasizing the complete *interdependence* of the fighting forces and industry, he admonishes his comrades-at-arms: "In turn, the soldier, recognizing the direct dependence of all forms of military effort upon adequate weapons and supply, must make it his own duty to coöperate with and to assist the industrialist in preparing for grave emergencies."

¶ The Army Ordnance Association for nearly thirty years has endeavored to stimulate the coördination and coöperation of which General Eisenhower is a forceful proponent. The formal pilgrimage of its officers and directors to the military shrine at West Point is a token of even greater effort on the part of the membership—*in preparing for grave emergencies.*

James L Walsh

President, Army Ordnance Association.

Association Affairs

A.O.A. AT WEST POINT: Association Officials Discuss Important Plans

One of the most important meetings of the Board of Directors of the Army Ordnance Association was held at the U. S. Hotel Thayer, West Point, N. Y., on October 31, 1947. It was called for the special purpose of considering proposals that had been made during recent months to change the name of the Army Ordnance Association to "American Ordnance Association."

Preceding the meeting, a dinner was given by President James L. Walsh in honor of Maj. Gen. Maxwell D. Taylor, Superintendent of the U. S. Military Academy, at whose invitation the meeting was held at West Point.

General Taylor delivered an after-dinner address which was a masterpiece of description. He spoke of the traditions, objectives, and curriculum of the U. S. Military Academy. We hope to be able to publish his address in an early issue of this magazine. Through his courtesy and the assistance of Col. John W. Coffey, Professor of Ordnance, and Lieut. Col. A. W. Giner, General Taylor's military secretary, the dinner meeting and the following day which was devoted to inspection of the Academy will long be remembered by all directors and members of Council who were present.

At the meeting, resolutions concerning the following subjects were presented and adopted:

1. Resolution memorializing the late Brig. Gen. Samuel McRoberts, a director of the Association.
2. Change of name of Army Ordnance Association to American Ordnance Association.
3. Visit of Leo A. Codd, executive vice-president of the Association, to American Zone of Occupation in Europe.
4. Establishment of December 7th of each year as Industrial Preparedness Day.
5. Resolution urging individual companies to prepare plant industrial mobilization plans.

Leader in the presentation of the resolutions was Col. H. A. Gidney, vice-president of the Association, who has worked so arduously during the past two years as chairman of the Association's Committee on Aims and Organization.

On November 1st, the following day, the A.O.A. officials were taken on a tour of the Academy. They had the distinction of dining with the cadets and of viewing a dress parade. They were also privileged to attend the Army-Washington and Lee football game in Michie Stadium.

The following officers, directors, members of Council, and special guests were in attendance:

Colonel Walsh, president; Colonel Gidney and Harvey C. Knowles, vice-presidents; William W. Coleman, C. Jared Ingersoll, Frederick H. Payne, John Slezak, and Charles D. Wiman, directors; Henry P. Erwin, treasurer and director; Colonel Codd, executive vice-president; Burton O. Lewis, staff consultant.

Members of Council: Charles D. Ammon, Lincoln, Nebr.; Frank B. Bell, Pittsburgh, Pa.; James H. Burns, Washington, D. C.; Ward M. Canaday, Toledo, Ohio; Edward B. Gallaher, Norwalk, Conn.; Ralph F. Gow, Worcester, Mass.; Edward T. Gushee, Detroit, Mich.; Stanley C. Hope, Springfield, Mass.; James D. Maitland, Denver, Colo.; Hugh C. Minton, Pittsburgh, Pa.; Emil F. Norelius, Springfield, Ill.; and Frank J. Smith, Rochester, N. Y.

Member of Advisory Board: Stewart E. Reimel, New York, N. Y.

Special guests: Hanson W. Baldwin, New York, N. Y.; Colonel Coffey, West Point, N. Y.; C. Stewart Comeaux, New York, N. Y.; C. E. Davies, New York, N. Y.; W. F. Feustel, Philadelphia, Pa.; A. W. Gilmer, Philadelphia, Pa.; Edward Gluck, New York, N. Y.; Courtney Johnson, South Bend, Ind.; Edwin Pugsley, New Haven, Conn.; and Harry M. Tillinghast, New York, N. Y.

K. T. KELLER HONORED: Presentation of Medal Climaxes Cincinnati Post Meeting

The Ordnance fraternity of Cincinnati turned out in record-breaking numbers for the annual meeting of the Cincinnati Post, Army Ordnance Association, which was held at the Queen City Club, October 22, 1947. The guest of honor and principal speaker was K. T. Keller, president of Chrysler Corporation, Detroit, and a director of the A.O.A.

He was presented with the Post's highest award, the Harrison Gold Medal for Distinguished Ordnance Service. The medal was founded in memory of the late Charles L. Harrison, first chief of the Cincinnati Ordnance District in World War I and for many years a leader in ordnance preparedness. Mr. Keller's address and the citation which accompanied the award are published on page 224 of this issue.

Presiding at the dinner was L. W. Scott Alter, president of the Cincinnati Post. The medal was presented to Mr. Keller by Harvey C. Knowles, chairman of the Post's Committee on Awards and vice-president of the Army Ordnance Association. The citation was read by Frederick V. Geier, also a member of the Post's Committee on Awards.

Among the special guests were Col. H. A. Gidney of Pittsburgh, Pa., vice-president, A.O.A.; William H. Mitchell, chief, Cincinnati Ordnance District; Brig. Gen. Burton O. Lewis, staff consultant, A.O.A.; Capt. Wells Thomson, U. S. Navy, inspector of naval matériel, Cincinnati; Lieut. Col. Charles H. Wood, deputy chief, Cincinnati Ordnance District; and Leo A. Codd, executive vice-president, A.O.A.

The dinner-meeting concluded a day of Ordnance activities including visits to the American Tool Works, Cincinnati Milling Machine Company, and Procter & Gamble Company.

MILWAUKEE: Local Post Hears General Eddy and Colonel Coleman

Maj. Gen. Manton S. Eddy, Director of Public Information, Department of the Army, was the guest of honor and principal speaker at the annual meeting of the Milwaukee Post, A.O.A., held at the Hotel Pfister, Milwaukee, October 15, 1947. General Eddy described the Army's program for the immediate future and delivered a most informative address on the subject.

Sharing honors with General Eddy was Col. William W. Coleman, founder of the Milwaukee Post and past president of the A.O.A., who made a brief address. Colonel Coleman had recently returned from a visit to England, and this meeting was also in the nature of a home-coming celebration for him.

"We must be fully prepared for any eventuality for a long time to come," Colonel Coleman said. "If a third World War should come upon us, there will be no time factor and no allies to hold the line while we prepare. We must be ready in every particular."

The toastmaster at the meeting was Col. Fred D. Hansen. He was assisted in the conduct of the meeting by the following committee: N. R. Knox, F. R. Bacon, P. H. Batten, L. R. Clausen, Colonel Coleman, J. E. DeLong, H. S. Falk, G. H. Fobian, Walter Geist, H. S. Johnson, Jr., H. V. Kohler, J. C. Merwin, R. A. Uihlein, P. J. E. Wood, and Jacobus Kruyne.

AT HOME ON THE RANGE: Mel Johnson Plays Host to Yankee Post

Mel Johnson's firing range was the scene of the fall meeting of the Yankee Post, A.O.A., on November 1, 1947. Mel is the well-known designer of automatic firearms, and he conducts his tests at his Diamond Hill Reservation, Cumberland, R. I.

There a goodly representation of the Ordnance fraternity assembled to inspect and fire U. S., Russian, German, and Japanese small arms. Some members brought their own favorite shotgun or rifle. Firing started at 10 A.M.

At noon a buffet luncheon was served after which there was a demonstration of the firepower of the various weapons, following which there was an informal discussion and question-and-answer period. Individual firing was resumed until 4 P.M. at which time a social hour brought the program to a close.

This was a novel and thoroughly enjoyable meeting of the Yankee Post. To Mel Johnson and his genial coworkers all members are indebted for a delightful and instructive day on the range and for an ideal opportunity to discuss automatic firearms.

TEXAS POST: Members Install New Officers, Hear General Eaker

The annual meeting of the Texas Post, Army Ordnance Association, was held at the Houston Club, Houston, Tex., on October 29, 1947, and featured an address by Lieut. Gen. Ira C. Eaker, former Deputy Commander of the Army Air Force. A friendship hour was held from 6 to 7 P.M., and served as a reunion for all members in and around Houston. Dinner was served at 7 P.M.

Immediately after the dinner, R. H. Startzell, Post president, called the meeting to order and welcomed guests and visitors after which the nominating committee reported results of elections and the following new officers and directors were installed:

President, F. M. Wittlinger, Texas Electric Steel Casting Company; vice-president, Herman Brien, Texas Foundries, Inc.; directors to serve during 1948-1949, E. D. Konken, Napko Paint & Varnish Works; W. O. Hedrick, McEvoy Company; Dr. L. B. Ryon, Rice Institute; Mr. Startzell, Sheffield Steel Corporation.

After the installation of officers, the secretary-treasurer gave his annual report.

The meeting was then turned over to the new president, Mr. Wittlinger, who made a brief acceptance speech. A motion was then placed before the members for the election of a new secretary-treasurer. Leo S. Bassett, Army Ordnance Department, was nominated and reëlected to serve for the 1948 term.

The next item on the program was a report by Ross Stewart, director, on his visit to the annual meeting of the Army Ordnance Association in New York City and Aberdeen Proving Ground.

At this time the meeting was turned over to D. J. Martin, director, who introduced his friend and guest of the evening, Col. Harry Rising, commanding officer of Watervliet Arsenal, Watervliet, N. Y. Colonel Rising made an interesting informal speech.

General Eaker then spoke on the topic, "Unification of Labor and Industry."

A motion was made by W. England of the Membership Committee to write national headquarters complimenting the Association on its A.O.A. Business Letter written by E. B. Gallaher. This motion was unanimously approved.—L. S. BASSETT, *Secretary.*

150 NEW MEMBERS: Philadelphia Post Has Fine Record

The Philadelphia Post was well represented at the Twenty-ninth Annual Meeting of the Association at the Waldorf-Astoria, New York City, on October 1st. The Philadelphia delegation was headed by William J. Meinel, president of the Post; C. Jared Ingersoll, national director; and Brig. Gen. David N. Hauseman.

Over 500 Philadelphia Post members attended the second session of the annual meeting at Aberdeen Proving Ground on the following day. Albert W. Gilmer and Robert T. Gebler were in charge of details. They arranged for a special train of ten cars over the Pennsylvania Railroad which, by the way, ran ahead of schedule in both directions.

The Post was host to associate members from several colleges including Delaware, Drexel, Pennsylvania, Princeton, Swarthmore, Temple, and Ursinus. The students occupied one car of the train and were addressed briefly by Mr. Meinel and General Hauseman on the way to Aberdeen.

The Post added about 150 new members to its roster during September and October. We wish to give them a hearty welcome and trust that they will join with the Post in its future activities.—W. F. FEUSTEL, *Secretary.*

NECROLOGY

Maj. George Bell Frankforter, long-time member of the Army Ordnance Association, died September 8, 1947, at the age of 88. At the time of his death he was dean emeritus of chemistry at the University of Minnesota.

In 1918, while on the faculty of the university, he secured a leave of absence and was commissioned in the United States Army. His assignment was that of chief of the Chemical Bureau, Army Ordnance Department.

Later he was supervisor of the control laboratory at Philadephia, then examiner for the Ordnance Claims Board and technical adviser for the War Claims Board.

As long as his health permitted, he was active in the support of the Army Ordnance Association and was a staunch member of its Northwest Post.

NOTICE also has been received of the deaths of the following members of the Association: M. T. Archer, Torrance, Calif.; D. Bartlett, Grosse Pointe Park, Mich.; J. C. Beck, Pittsburgh, Pa.; M. F. Breen, Donelson, Tenn.; Adolphus Busch, III, St. Louis, Mo.; Nick Ciabatoni, Woodbine, N. J.; A. C. Cummins, Youngstown, Ohio; H. F. Davis, Philadelphia, Pa.; R. W. Donovan, Detroit, Mich.; J. E. Dulaney, Richmond, Va.; O. P. Hicks, New York, N. Y.; A. S. Harris, Cleveland, Ohio; W. D. Hodson, Chicago, Ill.; W. F. Kaynor, Waterbury, Conn.; C. A. Kirk, Johnson City, N. Y.; I. C. Landes, Yerkes, Pa.; C. W. Machon, North Providence, R. I.; P. F. Macy, Dover, N. J.; E. J. Martin, Benton Harbor, Mich.; R. E. Maxwell, Kendall, Fla.; E. W. McKay, Atlanta, Ga.; R. P. McNulty, Brooklyn, N. Y.; H. E. Meyer, Detroit, Mich.; Arthur Nickols, Wolfeboro, N. H.; W. H. Phillips, Pittsburgh, Pa.; DeS. D. Purrington, Atherton, Calif.; Charles Raisig, Coraopolis, Pa.; H. L. Randall, Riverside, N. J.; D. T. Sanders, Chicago, Ill.; Peter Specht, Osseo, Minn.; R. L. Starr, Aberdeen Proving Ground, Md.; H. B. Steinbach, Cincinnati, Ohio; W. P. Stumpf, Hillsdale, Mich.; H. J. Suber, West Orange, N. J.; J. J. Tallinger, Waukesha, Wis.; F. W. Vorck, Wellesley Hills, Mass. To their relatives and friends, ORDNANCE, on behalf of the Association membership, extends condolences.

Honor Roll of Industrial Preparedness

Here are inscribed the names of the Company Members of the Army Ordnance Association, some of the principal industrial organizations of the United States which are leaders in effecting scientific and industrial preparedness for our security and peace.

ACF-BRILL MOTORS COMPANY . . . PHILADELPHIA
ACME STEEL COMPANY . . . . . CHICAGO
ADVANCE STAMPING COMPANY . . . . . DETROIT
AEROJET ENGINEERING CORPORATION . . . AZUSA
AETNA-STANDARD ENGINEERING COMPANY . . . . . YOUNGSTOWN
AIR REDUCTION SALES COMPANY . . . NEW YORK
AJAX ELECTROTHERMIC CORPORATION . TRENTON
ALLEGHENY LUDLUM STEEL CORP. . . BRACKENRIDGE
ALLIS-CHALMERS MANUFACTURING COMPANY . . . . . MILWAUKEE
ALTON BOX BOARD COMPANY . . . . . ALTON
ALTORFER BROTHERS COMPANY . . . . PEORIA
ALUMINUM COMPANY OF AMERICA . . . PITTSBURGH
AMERICAN BANTAM CAR COMPANY . . . . BUTLER
AMERICAN BOSCH CORPORATION . . SPRINGFIELD
AMERICAN BRASS COMPANY . . . . WATERBURY
AMERICAN CAR AND FOUNDRY COMPANY . NEW YORK
AMERICAN FORK & HOE COMPANY . . . CLEVELAND
AMERICAN HYDRAULICS, INC. . . . . SHEBOYGAN
AMERICAN INSTRUMENT COMPANY . . SILVER SPRING
AMERICAN LOCOMOTIVE COMPANY . . . NEW YORK
AMERICAN MACHINE & FOUNDRY CO. . . NEW YORK
AMERICAN METAL PRODUCTS COMPANY . . DETROIT
AMERICAN PULLEY COMPANY . . . PHILADELPHIA
AMERICAN RADIATOR & STANDARD SANITARY CORPORATION . . . . . PITTSBURGH
AMERICAN SEATING COMPANY . . . GRAND RAPIDS
AMERICAN STEEL & WIRE COMPANY . . CLEVELAND
AMERICAN VISCOSE CORPORATION . . . WILMINGTON
AMP CORPORATION . . . . . ST. LOUIS
ANCHOR PACKING COMPANY . . . PHILADELPHIA
ANHEUSER-BUSCH, INC. . . . . ST. LOUIS
ANIMAL TRAP COMPANY OF AMERICA . . . LITITZ
ARMSTRONG CORK COMPANY . . . . LANCASTER
ASSOCIATED SPRING CORPORATION . . . BRISTOL
ATLANTIC SHEET METAL CORPORATION . . ATLANTA
ATLAS POWDER COMPANY . . . . WILMINGTON
AUSTIN POWDER COMPANY . . . . CLEVELAND
AUTOCAR COMPANY . . . . . ARDMORE
AUTO SPECIALTIES MANUFACTURING COMPANY . . . . . ST. JOSEPH

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BAGLEY & SEWALL COMPANY . . . . WATERTOWN
BAKER & COMPANY . . . . . NEWARK
BAKER OIL TOOLS, INC. . . . . LOS ANGELES
BALDWIN COMPANY . . . . . CINCINNATI
BALDWIN LOCOMOTIVE WORKS . . . . EDDYSTONE
BARDONS & OLIVER, INC. . . . . CLEVELAND
BARNES COMPANY, W. F. & JOHN . . . ROCKFORD
BASTIAN-BLESSING COMPANY . . . . . CHICAGO
BAUER BROTHERS COMPANY . . . SPRINGFIELD
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BELLE CITY MALLEABLE IRON COMPANY . . RACINE
BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE COMPANY . . . . . ELYRIA
BETHLEHEM STEEL CORPORATION . . . BETHLEHEM
BIRDSBORO STEEL FOUNDRY & MACHINE COMPANY . . . . . BIRDSBORO
BLACK & DECKER MANUFACTURING COMPANY TOWSON
BLANCHARD MACHINE COMPANY . . . CAMBRIDGE
BLAW-KNOX COMPANY . . . . . BLAWNOX
BOSSERT COMPANY . . . . . UTICA
BOUND BROOK OIL-LESS BEARING COMPANY . . . . . BOUND BROOK
BOWSER, INC. . . . . FORT WAYNE
BREEZE CORPORATIONS, INC. . . . . NEWARK
BRIDGEPORT BRASS COMPANY . . . BRIDGEPORT
BRIGGS & STRATTON CORPORATION . . MILWAUKEE
BUCKEYE STEEL CASTINGS COMPANY . . COLUMBUS
BUCYRUS-ERIE COMPANY . . SOUTH MILWAUKEE
BUHL MANUFACTURING COMPANY . . . . DETROIT
BULOVA WATCH COMPANY . . . . . NEW YORK
BURKE COMPANY, O. W. . . . . DETROIT
BURKEY UNDERWEAR COMPANY . . . HAMBURG
BUTTERWORTH & SONS CO., H.W. . . PHILADELPHIA

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CARGOCAIRE ENGINEERING CORPORATION . NEW YORK
CARNEGIE-ILLINOIS STEEL CORPORATION PITTSBURGH
CARTER CARBURETOR CORPORATION . . ST. LOUIS
CASE COMPANY, J. I. . . . . RACINE
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CHAIN BELT COMPANY . . . . . MILWAUKEE
CHAMBERLIN COMPANY OF AMERICA . . . DETROIT
CHASE BRASS & COPPER COMPANY . . WATERBURY
CHICAGO EXTRUDED METALS COMPANY . . CICERO
CHRYSLER CORPORATION . . . . . DETROIT
CINCINNATI MILLING MACHINE COMPANY CINCINNATI
CITIES SERVICE DEFENSE CORPORATION . SHREVEPORT
CLARK GRAVE VAULT COMPANY . . . COLUMBUS
CLARY MULTIPLIER CORPORATION . . LOS ANGELES
CLEARING MACHINE CORPORATION . . . . CHICAGO
CLEVELAND CONTAINER COMPANY . . . CLEVELAND

(Continued on next page)

HONOR ROLL OF INDUSTRIAL PREPAREDNESS

Here are inscribed the names of the Company Members of the Army Ordnance Association, some of the principal industrial organizations of the United States which are leaders in effecting scientific and industrial preparedness for our security and peace.

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COLT'S MANUFACTURING COMPANY. . . HARTFORD
COLUMBUS BOLT WORKS COMPANY . . COLUMBUS
COMBUSTION ENGINEERING COMPANY . . NEW YORK
CONTAINER CORPORATION OF AMERICA . CHICAGO
COPPERWELD STEEL COMPANY . . . . WARREN
CORBITT COMPANY . . . . . HENDERSON
CRANE COMPANY . . . . . CHICAGO
CROWN CORK & SEAL COMPANY . . . BALTIMORE
CUSHMAN MOTOR WORKS . . . . . LINCOLN
CUTLER-HAMMER, INC. . . . . MILWAUKEE

DALTON FOUNDRIES, INC. . . . . WARSAW
DARLING VALVE & MANUFACTURING COMPANY . . . . . WILLIAMSPORT
DAVIS COMPANY, H. B. . . . . BALTIMORE
DAVISON CHEMICAL CORPORATION . . . BALTIMORE
DAYTON RUBBER MANUFACTURING COMPANY . DAYTON
DEERE & COMPANY . . . . . MOLINE
DEFIANCE AUTOMATIC SCREW COMPANY . DEFIANCE
DELCO-REMY DIVISION, GMC . . . . ANDERSON
DELTA MANUFACTURING COMPANY . . MILWAUKEE
DETROIT AUTOMOTIVE PRODUCTS CORP. . DETROIT
DEXTER COMPANY . . . . . FAIRFIELD
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DOEHLER-JARVIS CORPORATION . . . NEW YORK
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DUNCAN ELECTRIC MANUFACTURING COMPANY . . . . . LAFAYETTE
DU PONT DE NEMOURS & COMPANY, E. I. WILMINGTON
DURASTEEL COMPANY . . . . . HANNIBAL
DURIRON COMPANY . . . . . DAYTON
DUTTON COMPANY, C. H. . . . . KALAMAZOO

EASTERN STAINLESS STEEL CORPORATION . BALTIMORE
EASTERN TOOL & MANUFACTURING COMPANY . . . . . BLOOMFIELD
EASTMAN KODAK COMPANY . . . . ROCHESTER
EASY WASHING MACHINE CORPORATION . SYRACUSE
EATON MANUFACTURING COMPANY . . CLEVELAND
EDGEWATER STEEL COMPANY . . . PITTSBURGH
EDISON, INC., THOMAS A. . . . . WEST ORANGE
ELECTRIC AUTO-LITE COMPANY . . . . TOLEDO
ELECTRIC STORAGE BATTERY COMPANY PHILADELPHIA
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FALK CORPORATION . . . . . MILWAUKEE
FARBER, INC., S. W. . . . . BROOKLYN
FARQUHAR COMPANY, A. B. . . . . YORK
FEDERAL LABORATORIES, INC. . . . . PITTSBURGH
FEDERAL MOTOR TRUCK COMPANY . . . . DETROIT
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FLANNERY BOLT COMPANY . . . . . BRIDGEVILLE
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HENDRICK MANUFACTURING COMPANY . CARBONDALE
HENRY & WRIGHT MANUFACTURING COMPANY . . . . . CLEVELAND
HEPPENSTALL COMPANY . . . . . PITTSBURGH
HERCULES MOTORS CORPORATION . . . CANTON
HERCULES POWDER COMPANY . . . . WILMINGTON
HEYDEN CHEMICAL CORPORATION . . . NEW YORK
HIGH SPEED HAMMER COMPANY . . . ROCHESTER
HOBART MANUFACTURING COMPANY . . . TROY
HOE & COMPANY, R. . . . . NEW YORK

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HONOR ROLL OF INDUSTRIAL PREPAREDNESS

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HOOVER COMPANY . . . . . NORTH CANTON
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HUGHES TOOL COMPANY . . . . . HOUSTON
HYATT BEARINGS DIVISION, GMC . . . HARRISON

INLAND STEEL COMPANY . . . . . CHICAGO
INTERCHEMICAL CORPORATION . . . NEW YORK
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INTERNATIONAL NICKEL COMPANY . . NEW YORK

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KELLY-SPRINGFIELD TIRE COMPANY . CUMBERLAND
KELSEY-HAYES WHEEL COMPANY . . . . DETROIT
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KINGSBURY MACHINE TOOL CORPORATION . KEENE
KNAPP-MONARCH COMPANY . . . . ST. LOUIS
KOEHRING COMPANY . . . . . MILWAUKEE
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LANSDOWNE STEEL & IRON COMPANY . . MORTON
LAPOINTE MACHINE TOOL COMPANY . . . HUDSON
LEBANON STEEL FOUNDRY . . . . . LEBANON
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LEEDS & NORTHROP COMPANY . . . PHILADELPHIA
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LIEBERKNECHT, INC., KARL . . . . . READING
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LINCOLN ENGINEERING COMPANY . . . ST. LOUIS
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LUKENS STEEL COMPANY . . . . COATESVILLE
LYNCHBURG FOUNDRY COMPANY . . LYNCHBURG

MARLIN-ROCKWELL CORPORATION . . JAMESTOWN
MASLAND & SONS, C. H. . . . . CARLISLE
MASON & HANGER COMPANY . . . . NEW YORK
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MAXSON CORPORATION, W. L. . . . . NEW YORK
MCKAY COMPANY . . . . . PITTSBURGH
MICA INSULATOR COMPANY . . . . NEW YORK
MIDWEST PIPING AND SUPPLY COMPANY . ST. LOUIS
MILCO UNDERGARMENT COMPANY . . BLOOMSBURG
MILWAUKEE SADDLERY COMPANY . . . MILWAUKEE
MINES EQUIPMENT COMPANY . . . . ST. LOUIS
MINNEAPOLIS-HONEYWELL REGULATOR COMPANY . . . . . MINNEAPOLIS
MINNEAPOLIS-MOLINE POWER IMPLEMENT COMPANY . . . . . MINNEAPOLIS
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MOORE ENAMELING & MANUFACTURING COMPANY . . . . . WEST LAFAYETTE
MOSLER SAFE COMPANY . . . . . HAMILTON
MULLINS MANUFACTURING CORPORATION . . SALEM
MUNSINGWEAR, INC. . . . . MINNEAPOLIS

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(Continued on next page)

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Here are inscribed the names of the Company Members of the Army Ordnance Association, some of the principal industrial organizations of the United States which are leaders in effecting scientific and industrial preparedness for our security and peace.

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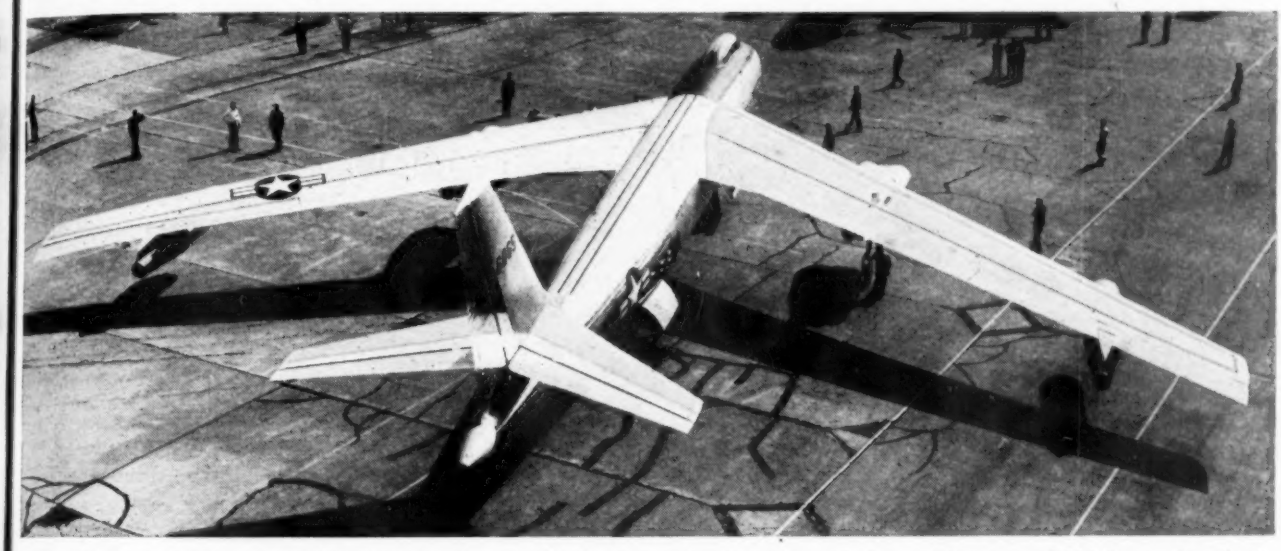
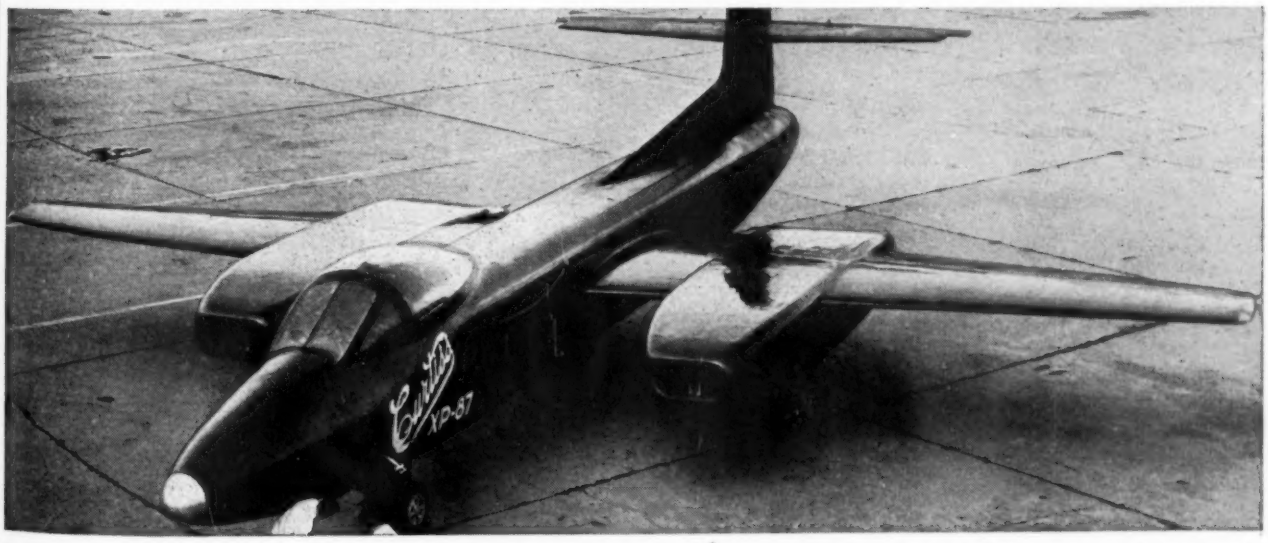
New Army Aircraft

The Kellett XR-10 is the first all-metal, twin-engined transport-type helicopter in our Air Force. With intermeshing rotors, it has a top speed of over 100 m.p.h., can carry 12 people, and can travel 350 miles at its cruising speed of 90 m.p.h.



The radical jet bomber, the XB-47, has sharply swept-back wings and tail surfaces. It has a wing span of 116 feet, a length of 108 feet, tandem landing gear, and is powered by 6 jets, 4 in 2 nacelles inboard, and 2 singly out near the wing tips.



The XP-87 is the first Army fighter powered by 4 jet engines. Operated by a 2-man crew, the airplane has a wing span of 60 feet and a length of 65 feet. Using the newest deicing equipment, it will function under extreme conditions (USAF photos).

Atomic Energy

ATOMIC DATA FOR INDUSTRY

David E. Lilienthal has announced formation of a board of industrial consultants to assist the United States Atomic Energy Commission, of which he is chairman, in making atomic-energy discoveries more quickly available to industry.

Heading the consultants' board will be James W. Parker of Detroit, president and general manager of the Detroit Edison Company.

Other members include O. E. Buckley, president, Bell Telephone Laboratories, New York; Donald F. Carpenter, vice-president, Remington Arms Company, Bridgeport, Conn.; Paul Foote, executive vice-president, Gulf Research & Development Company, Pittsburgh; and Robert E. Wilson, chairman of the board, Standard Oil Company of Indiana, Chicago, Ill.

Col. Walker Cisler, chief engineer of Detroit Edison power plants and now serving as consultant to the Commission, was named executive secretary to the group.

DETECTION OF ATOMIC BLASTS

Disregarding possible use of "orthodox" methods of espionage, what are the scientific methods that might be used to detect a test explosion of an atomic bomb a long way off?

Principal methods suggested are three: seismic—checking on the earthquakelike waves in the earth started by such a giant explosion; microbarographic—detection of a pressure wave in the air; radiometric—spotting of the spreading cloud of atomic fragments by their electrical charges.

Least promising, probably, is the seismic method. The jar of the Alamagordo (N. Mex.) test was detected by a few earthquake observatories, but these were less than 300 miles away; more remote instruments, even in the United States, showed no trace of it.

Use of the microbarograph, which is an instrument built to record exceedingly minute changes in air pressure, does not seem much more promising.

The radiometric method, therefore, seems the surest way of detecting the explosion of an atomic bomb almost anywhere in the world.

NEW MESOTRON?

Under Navy contract, scientists conducting cosmic-ray research have discovered information about the particle known as mesotron. A mesotron is one of the particles released when a cosmic ray splits an atom.

Out of thousands of photographs taken in the past few months from a B-29 flying high above the Sierras, research workers have discovered one picture which shows a mesotron bursting into other particles having energies totally different from what had been calculated by nuclear physicists.

The new discovery upsets the theory that when a mesotron disintegrates it releases two particles, an electron and a neutrino, each carrying 50-million electron volts of energy. By discovering a particle in a mesotron explosion which carries only 24-million electron volts, it has shown that either there is more than one kind of mesotron or that mesotrons break up into several different kinds of particles.

NAVY TESTS "CROSSROADS" GUNS

The U. S. Naval Gun Factory, under close supervision of officers and engineers of the Navy Bureau of Ordnance, have begun an inspection and evaluation of atomic-bomb damage to destroyer guns. Items of armament under observation are from the target ships used in the atomic-bomb tests during Operation Crossroads at Bikini.

The inspection is being conducted to determine the extent of damage to the weapons for the purpose of redesigning the guns and improving the materials and techniques involved. All necessary measures have been taken to guard personnel involved from the remote possibility of harmful radiological exposure.

5,000,000-VOLT GENERATOR USED

Scientists of the University of Minnesota are experimenting in an attempt to learn what holds matter together by scattering the atom's nucleus—the world's smallest particle of matter.

For their experiments the scientists are using a 5,000,000-volt electrostatic generator, most powerful of its type in the Nation.

Dr. John Williams, who had an important rôle in developing the atomic bomb, is directing the project. Dr. J. Morris Blair is his chief assistant.

Dr. Williams said that no one knew precisely what reactions would result when the nucleus was scattered by driving it at terrifically high speeds against atoms of helium, nitrogen, and other gases.

The 36-foot generator for the experiment now is capable of producing a voltage nearly 1,000,000 volts greater than ever produced before by a similar machine. Test results will be accurately recorded on a special 10-channel "discrimination board," a complicated control assembly that will count the number of pulses of energy given off by each "bullet" particle driven into the target chamber where the receiving atoms are located.

RADIOACTIVE MATERIALS SOUGHT

Twenty parties have been in the field throughout the northwest territories of Canada prospecting for radioactive materials, Reconstruction Minister C. D. Howe told the House of Commons during a debate in committee on the expenses of the Atomic Energy Control Board. In addition, Mr. Howe said the Department of Mines and Resources had a few parties doing the same thing.

All the prospecting parties directly searching for radioactive materials are in the northwest territories, he said, if for no other reason than the fact that no discovery of radioactive materials has ever been made elsewhere in Canada.

Any discovery of raw material by these parties or private enterprise must be reported to the government. It cannot be privately staked at the present time.

BRITISH ATOMIC PILE COMPLETED

Britain became the second nation in the world with a working atomic pile last August as the first nuclear fission plant at Harwell, twelve miles south of Oxford, began operation.

The United Kingdom's first atomic pile is called "gleep" (graphite low-energy experimental pile) and was built primarily for experiments in nuclear physics. It also will be used to produce radioactive isotopes for biological and medical research.

The pile is the first of three planned by Britain. Another will start operation at Harwell this year and an atomic-energy power plant will go up along the Cumberland coast in northwest England.

RADIATION EFFECTS STUDIED

The effects of radiation from the atomic bomb on Japanese children and their children's children will be investigated in studies under the guidance of American experts. The studies will be part of a long-range research program to be undertaken jointly by the Atomic Energy Commission and the National Research Council.

The effects of atomic radiation on blood cells and on the development of various disease conditions will also be studied.

Excellent health safety records have been maintained in the

atomic-energy industry, and there is no reliable evidence so far on which to base an opinion about the frequency of abnormalities among children born in Hiroshima and Nagasaki since the atomic attacks. But with radioactive substances playing an increasingly important rôle in everyday life it is important to gain all possible information on the subject.

The long-range research program is a result of a directive issued by President Truman. It will be financed by the Atomic Energy Commission and the scientific program will be directed by the National Research Council's committee on atomic casualties. As far as practicable, Japanese scientists will take part in the studies.

NEW ATOM SMASHER

A 3-foot atom smasher may be the prototype of a powerful new instrument for producing artificial particles as potent as cosmic rays in the laboratory. It is the electron linear accelerator built and operated at the Stanford University Microwave Laboratory. A projected larger model of the accelerator, 100 to 200 feet long, could develop a billion electron volts.

Electrons, the negatively charged outer particles of atoms, travel through the pipelike tube of the accelerator on microwaves. The microwaves are generated by a million-watt magnetron in the new atom smasher. A billion-watt model of the accelerator will bring high-voltage energy of the order of cosmic rays into scientific laboratories for study.

Thus far, the 3-foot accelerator has produced electrons of more than 1,500,000 volts. The instrument was built at Stanford under contract with the Office of Naval Research.

Gold-plated disks inside the tube of the atom smasher slow down the microwaves to the speed of the slower electrons. As the electrons travel through the tube, they pick up energy which increases their mass. At one point in its lightning journey, the tiny particle weighs 2,000 times as much as it does at rest.

DIAMONDS COUNT RADIATION

Diamonds can be used to detect and "count" the radiations of uranium and other radioactive materials, it was disclosed recently by the National Bureau of Standards. This discovery may give atomic scientists a new tool and offer a new type of alarm instrument to protect the lives of atomic workers from potentially deadly rays.

Tests have shown that diamonds, size for size, are a thousand times more sensitive detectors of alpha, beta, and gamma rays than any man-made counter.

Diamonds used as counters in the same manner as the Geiger-Mueller counter have two big advantages over standard radiation-counting instruments. Diamond counters could be used for a long time, compared with the three months to two years of use for standard equipment, and the diamond counters can be far smaller. Small size will permit diamond counters to be used inside the human body or in small openings in industrial equipment, scientists at the Bureau of Standards explained.

To detect and measure the radiation from radioactive materials, the diamonds must be colorless and "perfect." Only one diamond in forty is estimated to qualify.

Diamond counters tested at the Bureau of Standards use standard counting apparatus with the diamond placed between two small brass electrodes. One electrode puts 1,000 volts of electricity across the diamond, while the other connects with the counting apparatus.

Rays from radioactive materials are counted by setting up an electrical pulse when they strike the counter. When a ray strikes a diamond, it knocks an electron off one of the atoms in the diamond molecule to set off the electrical pulse.

LIGHT ELEMENTS FISSIONED

Fission, originally confined to the heaviest elements such as uranium and plutonium, has been caused in atomic nuclei as light as tantalum, element 73, by ultrahigh-energy atomic bullets fired by the giant University of California cyclotron.

Splitting of nuclei in the fission reaction was achieved with platinum, lead, bismuth, and thallium, as well as with tantalum, a group of Berkeley scientists have reported.

The scientists add that elements between tantalum and bismuth, the heaviest of the five, probably could be "fissioned," but that no efforts have been made to do so yet. These intermediate elements include mercury, gold, iridium, osmium, rhenium, and tungsten.

Ultrahigh-energy fission with deuterons, neutrons, and alpha particles differs from the slow neutron fission which causes an atomic bomb to explode. There is no chain reaction, therefore the high-energy fission reaction in these elements is not applicable to making a bomb or to atomic energy. However, such research is invaluable in yielding new fundamental information about the atomic nucleus.

ATOMIC PHYSICS DIVISION

The National Bureau of Standards has formed a Division of Atomic Physics in which the main Bureau activities relating to atomic and molecular physics have been grouped together. The new division includes most of the basic lines of activity which made it possible for the Bureau of Standards to coordinate and direct, under its Presidential directive, the activities of the atomic-bomb project from its inception in the fall of 1939 until 1942 when it developed into a large-scale industrial undertaking.

The functions of the new division are the promotion of fundamental fact-finding research and the precise determination of important fundamental standards in the field of atomic physics. This research will be applied to the establishment of primary and secondary standards of reference as, for example, calibrated sources of radiation or meters for dosage and the calibration of instruments used in atomic physics studies.

It is also responsible for the development of protective and safety codes for the reduction of industrial hazards arising from new applications of physics and for the study of materials and equipment for the protection of the interests of the Government as a large consumer. Six sections make up the new division: spectroscopy, electronics, mass spectrometry, radioactivity, X-rays, and atomic physics.

LOS ALAMOS TO EXPAND

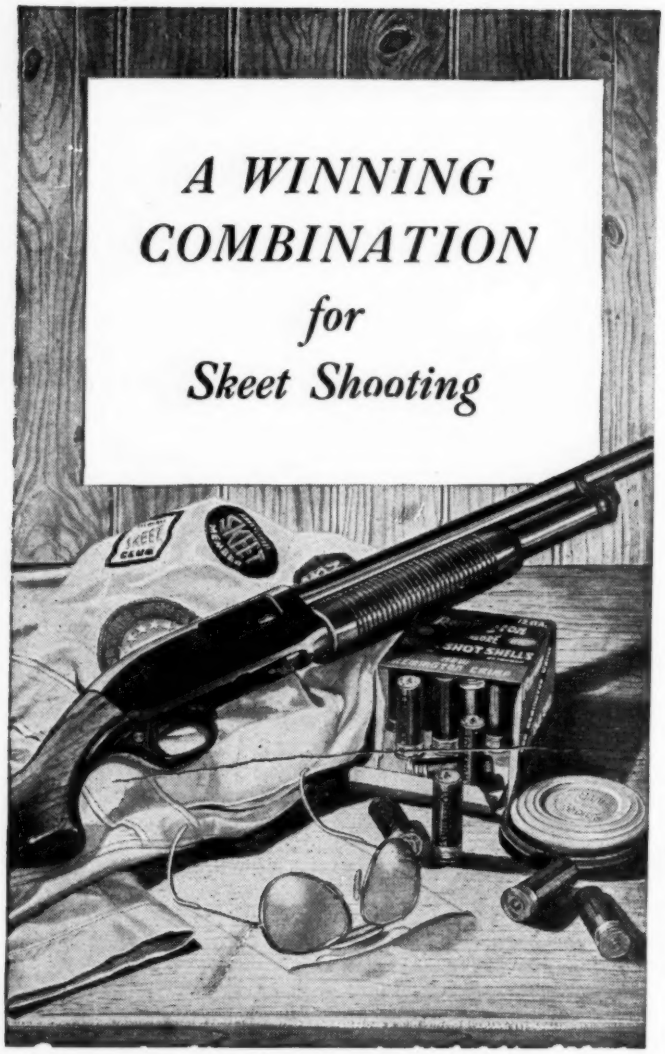
The Atomic Energy Commission has started a multimillion-dollar project to enlarge its atomic weapons development center at Los Alamos, N. Mex. Detailed plans have been announced for construction of houses and other facilities for personnel at Los Alamos. The project also includes extensive additions to technical areas.

The building project is scheduled for completion in 1949. It includes 13 apartment buildings and more than 1,000 new homes to replace barracks and huts in which the population of more than 7,000 has been living.

Los Alamos is the principal center for the military applications of atomic energy and the work under way in the double-fenced exclusion areas of the 45,000-acre reservation is highly classified. Full security restrictions are maintained, but the modernizing of the town is expected to ensure a more normal community development.

A new business section will be built with stores, a theater, radio station, newspaper, and other services to be operated by concessionaires. Included in the project are reconstruction of utilities, two new schools, a church to be used by all denominations, playgrounds, a swimming pool, tennis courts, and fields for football, baseball, and track.

Capt. Carroll L. Tyler, U. S. Navy, Retired, a former director of naval ordnance research and development, has been appointed manager at Los Alamos.



Skeet is a great sport—one you can enjoy for years to come. However, your fullest appreciation comes as your skill increases. And that's when you find that the *right* gun and the *right* ammunition count most.

Champion skeet shooters have found a *winning* combination in the Remington Model 31 shotgun and Remington Shur Shot shells with the New Remington Crimp. The Model 31 is a pump action repeating shotgun which, during the war, aerial gunnery students nicknamed "the gun with the 'ball-bearing' action" because of its velvety-smooth operation. And Shur Shot shells with the New Remington Crimp eliminate "blown patterns" which cause those unexplainable misses. There is no top wad to obstruct the shot charge. Thus, you get even distribution of shot pellets with no holes or openings for targets to pass through unbroken.

For free literature on this popular combination, write Remington Arms Company, Inc., Bridgeport 2, Conn.

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OR FORFEIT FREEDOM. By Robert Wood Johnson. Garden City: Doubleday & Company. 271 pp. $2.50.

THIS book deals with two related subjects: the basic functions of American business and problems of labor-management relations which must be met if those functions are to be performed. The result is a set of specific suggestions, fitting into a program of total service by our system of private enterprise.

In the general field of business principles, Mr. Johnson believes we must (1) accept attainment of a decent living for all as the fundamental goal of business; (2) reduce prices on all goods as much as improved methods, materials, and customer requirements permit; (3) pay adequate wages to every worker—first because he deserves them and secondly because they are essential to prosperity; (4) accept and meet the social, educational, and community obligations of business; (5) avoid the evils of monopoly and great size; and (6) achieve satisfactory relationships with government for the public good.

In the specific field of worker-management relations Mr. Johnson believes we must (1) realize that both workers and managers are human beings; (2) state employment policies in the form of a written code that is subject to constant scrutiny and periodic revision; (3) set up a personnel department to handle personnel matters on a professional basis, including a grievance system and a broad training program for both management and workers; (4) undertake to improve and give dignity to all jobs, from the sweeper's to the president's; (5) develop worker-management understanding; (6) work out the best and most realistic contracts possible and interpret them to both management and workers; (7) establish an effective community-relations program, emphasizing public information; and (8) decentralize both physically and in administration, thus avoiding business bureaucracy.

American business has perhaps one last chance to put its own house in order. The dismal alternative is some form of economic dictatorship.—JOHN J. O'CONNOR.

THE NEW SLAVERY. By Hoffman Nickerson. Garden City: Doubleday & Company. 271 pp. $3.50.

HOFFMAN NICKERSON has not written a more convincing book than this during his long and successful career as military

The Ordnance Book of the Month

OR FORFEIT FREEDOM

By Robert Wood Johnson

The chairman of the board of Johnson & Johnson explains how he thinks labor and management can work together to save American industry. He brings out the obligations of business to the community as well as the individual and the fact that full employment cannot be attained without full production. The author is critical of some of the mistakes of business as well as those of labor and urges realistic labor relations and employee education. Retail price $2.50. To members $2.12.

THE NEW SLAVERY

by Hoffman Nickerson

Mr. Nickerson traces the history of slavery since early times, when it was universal, to slavery as it exists in the world today, with emphasis on forced labor as manifested in Soviet Russia. The author also warns that the Western civilization has become reinfected with the initial stages of the slavery disease with the advent of recent "welfare" legislation and the consequent loss of personal responsibility. Retail price $3.50. To members $2.97.

WAR AS I KNEW IT

by Gen. George S. Patton, Jr.

Out of the mass of confused testimony about Patton and the attacks upon his leadership and work only two signposts stand. The first is the record of his achievements and the second is "War as I Knew It"—the book he wrote himself about war as he fought it. The book contains the rules and principles forged from the General's fighting experience in three wars—principles which constantly illuminate his thought and actions. Retail price $3.75. To members $3.19.

HATCHER'S NOTEBOOK

by Maj. Gen. Julian S. Hatcher

Notes on weapons, arms, production, ballistics, powder, etc., gained from almost half a century of experience with small arms has gone into Julian S. Hatcher's latest work. In this intimate volume the Technical Editor of *The American Rifleman* turns over a vast fund of information which is invaluable to gunsmiths, hunters, and collectors. Retail price $5.00. To members $4.25.

COMPANY COMMANDER

by Charles B. MacDonald

"Company Commander" is beyond question the best book to come out of World War II to date—and the best ever written by a company commander about his experiences. Charles MacDonald took over command of an infantry company in the Second Division a short time before the Battle of the Bulge and commanded a company throughout the war. "Company Commander" is the vivid, honest, direct story of his part in the war. Retail price $3.00. To members $2.55.

SPEAKING FRANKLY

by James F. Byrnes

Virtually all the information contained in this book was heretofore unpublished. Much of it—notably the record of the Hitler-Molotov conversations and the Russian plan of empire—is based on captured secret German documents. This is his story of the international conferences and conference interludes, of the diplomatic trials and errors, the crises, failures, and accomplishments of those two eventful, decisive years following V-E Day. Retail price $3.50. To members $2.97.

WEAPONS OF WORLD WAR II

by Maj. Gen. G. M. Barnes

This highly interesting and informative volume on the achievements of the Science-Industry-Ordnance team is as complete as possible and is of especial interest to all those who designed, produced, or used American weapons and combat equipment in World War II. Retail price $7.50. To members $6.25.

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by Col. Chester Mueller

Colonel Mueller shows clearly how the Ordnance procurement district system operated under wartime pressures and the ways in which these great procurement centers helped the American armed forces achieve victory. Retail price $5.00. To members $4.50.

THE INDUSTRY-ORDNANCE TEAM

by Lieut. Gen. Levin H. Campbell, Jr.

The major theme of this book is the wholehearted coöperation of industry and Ordnance in the gigantic problem of arming the freedom-loving nations of the world. General Campbell was Chief of the Ordnance program for World War II. Retail price $5.00. To members $4.00.

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Book Reviews

analyst and historian. "The New Slavery" is a complete analysis of Russia's forced labor system which in itself is the latest recurrence of an ancient evil with which mankind has been afflicted since the dawn of creation.

In an exhaustive way, the author analyzes the peaks and valleys in the record of slavery and surprisingly enough reveals the twentieth century as one of the most deeply afflicted of all times. He has reviewed the factual records of a number of authorities who have written on labor conditions in Russia, and from this study makes a devastating indictment.

He sees in the doctrines of Bismarck, with their tenets of welfare legislation and consequent loss of personal responsibility, a rising threat to freedom and Western civilization.—L. A. Codd.

War As I Knew It. By Gen. George S. Patton, Jr. New York: Houghton Mifflin Company. 425 pp. $3.75.

THIS is one of the most valuable—if not the most valuable—of source materials for the true military history of World War II. Dr. Douglas Southall Freeman in his introduction to the book says:

"He (General Patton) was a man to win, to intrigue, and sometimes to enrage his fellow commanders. Always he fulfilled the Napoleonic mandate of supplying by picturesque conduct the *causerie de bivouac* that makes soldiers swear at their commander and then swear by him."

The book itself, General Patton's own diary and personal comment, is unglossed and unabridged. Here are recorded the judgments, reactions, and remarks of a military leader whom many Americans regard as the predominant tactician of World War II. His qualities of leadership, boldness, and fearlessness mark him as a soldier's soldier.

Those whom he charges with lack of vision in not permitting him to end the war in Europe much earlier than it was won will be hard put to give a satisfactory explanation; so also will those military leaders who were responsible for the outrageous logistics which permitted their forces to lack adequate supplies when the battle of Europe was at its height, despite the mountains of matériel produced by American industry.

Here was a soldier who brought back to the battlefield all the skill of the great military leaders of the past. The shameful way in which he was relieved of his command of the great Third Army casts serious doubt as to the wisdom of his superiors. "War As I Knew It," a human and eloquent story told by a great military genius, is a book to be read and reread by all who have the best interests of our country at heart.—L. A. Codd.

Hatcher's Notebook. By Maj. Gen. Julian S. Hatcher, U. S. Army, Retired. Harrisburg: Military Service Publishing Company. 488 pp. $5.

JULIAN HATCHER is beyond dispute the dean of modern small-arms authorities. The title of his book should have been "Hatcher on Small Arms," for the contents and scope of this invaluable work go far beyond any conception of a "notebook."

Unfortunately "Hatcher's Notebook" falls far short of this reviewer's expectations—there isn't enough of it. The man has held back. All will be forgiven if he will write a second and third volume, however. As technical director of the National Rifle Association and now retired from a brilliant career in the service, General Hatcher has no good excuse to rest on his oars, even admitting that he has authored four previous books and many articles.

"Hatcher's Notebook," though devoted to a technical subject, is so clearly and interestingly written and covers so many significant facts and incidents that even those not especially interested in small arms should read it. Chapters 5 and 6, covering machine guns and semiautomatics, are full of fascinating anecdotes and "on-the-ground" comments by an expert who was there.

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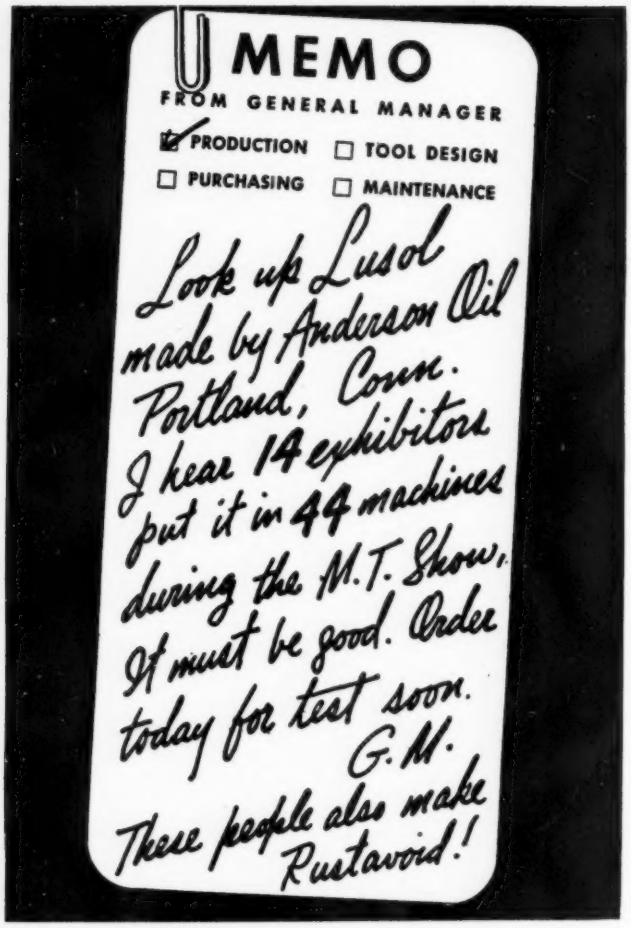
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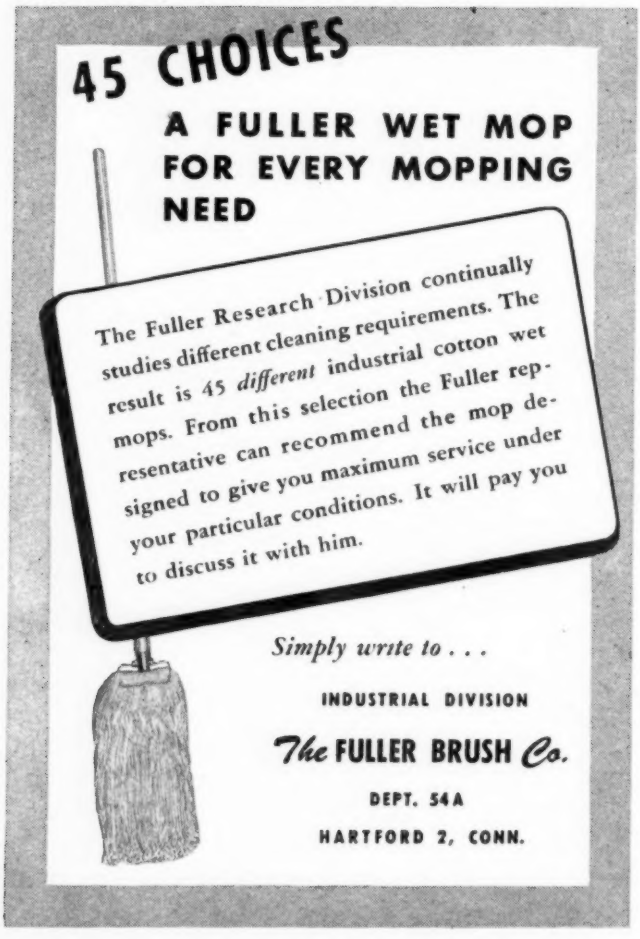
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Book Reviews

The author devotes several chapters to a discussion and analysis of "blown-up" rifles and their barrels, as well as to proper steels and heat treatments. There are two chapters on recoil and kick, and an especially valuable chapter on head space.

On the historical side he includes a most intriguing chapter on the once secret Pedersen device of 1918, and there are also many details on early machine guns and the French "mitrailleuse."

The inside story of the development by Col. René R. Studler, Ordnance Research and Development Service, of the famous 57-mm. and 75-mm. recoilless guns is included.

Apart from general interest, this book contains invaluable and hitherto unavailable data and tables on powders, bullets, detailed cartridge dimensions, and highly practical information on interior and exterior ballistics. Any one who studies small arms for any purpose will need this book which, incidentally, is most generously illustrated with excellent pictures of many rare modern weapons and models.—MELVIN M. JOHNSON, JR.

GERMAN RESEARCH IN WORLD WAR II. By Col. Leslie E. Simon. New York: John Wiley & Sons. 220 pp. $4.

HERE is a book which is a "must" not only for Ordnance officers and engineers but also for students of research and those interested in the design, development, and production of ordnance matériel.

The author was one of that rather large group of competent individuals who were sent to Germany prior to her surrender to learn what they could about German war matériel, methods of production, industrial technique, research projects, and almost anything else which could be of use to the allies in the remainder of the war and of general value during peace.

Colonel Simon was well qualified to be a member of these investigating bodies, having been director of the Ordnance Department's Ballistic Research Laboratory during the entire war and assistant director for four years before the war. During that service he developed a genuine curiosity as to how and in just what way the Germans apparently were able to get the product of their research swiftly into practical use. This book sheds considerable light on that question.

Individual chapters present summaries of the more important research in interior, exterior, and terminal ballistics, and fire control. Briefly described are the more important works in aërodynamics, recording and observing instruments, measurement techniques, and miscellaneous developments such as the wind gun, sound as a weapon, arrow projectiles, and, of course, the Germans' eternal dream of a "super" gun.—R. M.

KNUDSEN—A BIOGRAPHY. By Norman Beasley. New York: Whittlesey House. 396 pp. $3.75.

IN this biography of William Knudsen a man and his era are effectively described and correlated. The success story of the Danish immigrant who reached New York in 1900 when he was 21 years old is almost incredible and undoubtedly would be impossible in any other country.

Forty years after landing here the President of the United States called on Knudsen to start the industrial mobilization in a period of great national danger. During those previous forty years "Bill" Knudsen had developed and put into practice his ideas of industrial management and production that had built up Ford and then Chevrolet to unheard-of size and economical output.

Any one who, like the reviewer, had enjoyed the good fortune of listening to Knudsen address the Industrial College, had accompanied him on a number of his tours of manufacturing plants in 1942, and had sat in while managements explained their bottlenecks, knows the powerful personality, the amazing energy, the

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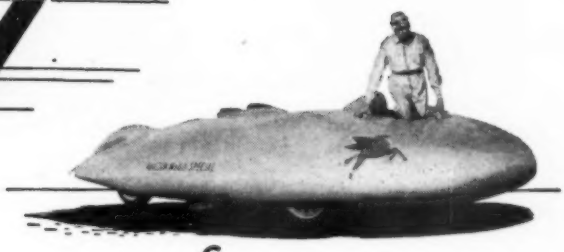
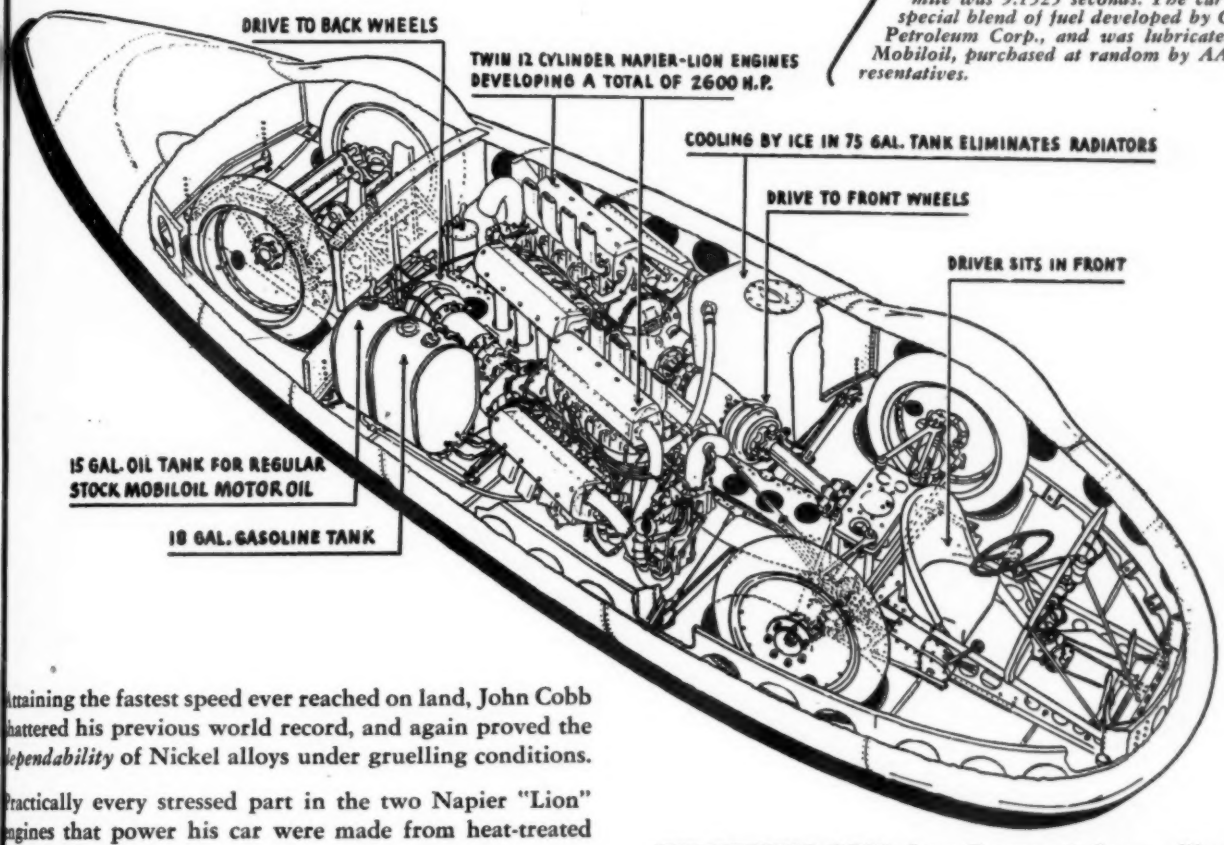


John Cobb drove this "Railton Mobil Special" over the measured mile on the Bonneville Salt Flats in 8.93 seconds . . . a speed exceeding 403 miles per hour. His average time for the mile was 9.1325 seconds. The car used a special blend of fuel developed by General Petroleum Corp., and was lubricated with Mobiloil, purchased at random by AAA representatives.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THE UNIQUE UNIVERSAL JOINTS made for this car by Laycock Engineering Co., utilize a 3½ percent Nickel steel spline shaft joined to the housing with bolts of the same Nickel content.

THE SPEEDSTER'S FRAME was produced by John Thompson Motor Pressings, Ltd., in Nickel alloyed steel with a minimum tensile strength of 100,000 p.s.i.

THE STEERING GEAR, from Burman & Sons, utilizes two Nickel steels and one Nickel-chromium-molybdenum steel, heat treated to high strength and toughness.

WHEELS FOR THIS CAR are the same ones made by Dunlop Rim & Wheel Co., Ltd., for Cobb's 1939 record run. They incorporate rims produced from forged rings of a 3½ percent Nickel steel and held together on each wheel by bolts of "18-2" stainless steel, heat treated prior to machining.

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Book Reviews

profound knowledge of industrial processes, the dry humor of this great American.

All these have been translated into a most readable and thoroughly enjoyable life of an eminent industrialist who stimulated production when that was the basic need to win the late war.

Norman Beasley's life of Knudsen the industrialist and lieutenant general in the Army is frankly eulogistic but, considering what Knudsen achieved in contemporary history, the biographer's enthusiastic admiration is fully justified.—DONALD ARMSTRONG.

WEST POINT—THE KEY TO AMERICA. By John Crane and James F. Kieley. New York: Whittlesey House. 319 pp. $6.

THIS is a beautifully prepared picture book of the United States Military Academy from its beginnings in 1802 to this very year. Every phase of the West Point curriculum, its traditions, its buildings, its personnel and leaders among its alumni are pictured or described. The photography and especially the color reproductions are superior.

John Crane (Dr. J. de Murinelly Crane Cirne) is the author of a number of historical books and is also editor, publisher, and author of the "American Patriot Series" and the "American War Leader Series."

Mr. Kieley, following his service with the Bureau of Naval Personnel in Washington, has returned to the U. S. Maritime Commission as a member of its Division of Information.—LEO A. CODD.

FERROUS METALLURGICAL DESIGN. By John H. Hollomon and Leonard D. Jaffe. New York: John Wiley & Sons, Inc. London: Chapman & Hall, Ltd. 346 pp. $5.

THIS volume is a major attempt to establish a fundamental engineering approach to the problem of metallurgical design of steel parts with optimum mechanical properties. The problem is treated as three interrelated sections: (1) shape and mechanical properties, (2) composition, and (3) heat treatment. It should be of special interest to steel metallurgists dealing with design and production.

On the basis that design generally should be founded upon knowledge of transformations, mechanical behavior, and heat flow during treatment, and that optimum combination of life, strength, and toughness are obtained with tempered martensite, the authors ably propose a rational procedure for utilizing the known principles and applicable data currently available to determine optimum composition and heat treatment.

Admittedly not perfect, the volume indicates what can be done with our present imperfect knowledge. Many fundamental metallurgical principles and many quantitative data necessary for their application are not available. The authors have suggested fields in which further investigation should produce useful results.—S. B. RITCHIE.

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